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Plaster model of a portion of "Fisheries" pediment, Department of Commerce Building. James Earle Fraser, sculptor

If it is difficult to see these pediments, it is much more difficult to photograph them in place

Is Architectural Sculpture Worth What It Costs?

By Edwin Bateman Morris

THE appeal of sculpture is an appeal to the heart. It is an art whose message is difficult to analyze and catalogue, because part of our appreciation of it is in the nature of an inherited reverence for it.

Beginning with the first scratchings on soft stone by primitive men, the tide of civilization through centuries was marked and pegged by carved representations, crystallizing national aspirations, commemorating historic events, telling stories of life.

By the time the zenith of Greek culture arrived, sculpture was not only a symbolism, it was as well the relaxation of the pleasure-seeker. There were very few playtime occupations for the persons of that day. We can well imagine the Athenian society youth dating up his girl, on occasions when there were no Olympic games, to visit the Acropolis and look at the Parthenon metopes, in the same enthusiastic spirit that a plan is made today to toddle over to the movies.

Through the ages new pleasant occupations for leisure have continually been devised and perfected—tournaments, athletic sports, a light and spectacular theatre to replace the solemn Greek idea, square dancing, bridge, movies, radio.

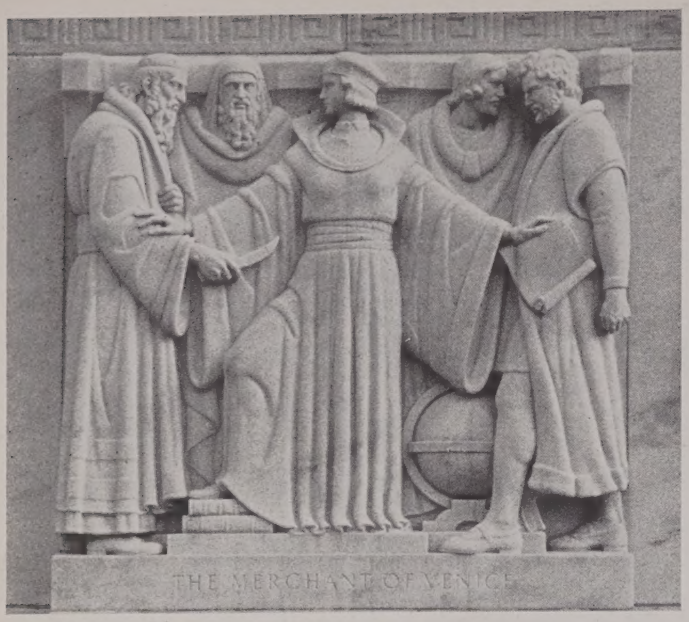
Sculpture and painting have thus become cultural arts rather than diversions. They have become gravely precious to us. The enjoyment of them now, to a considerable extent, is emotional, deep-seated, atavistic.

The awe inspired by statues—which is in a way akin to the breathless reverence with which we view the stars in a clear sky—is because of their appeal to something ancient in us.

We glance up at sculpture as we go by, and while we are frequently preoccupied and unseeing, it is vastly comforting to us. If our cities were suddenly deprived of their statues, there would be a gap left in our lives that would be difficult to reconcile and understand.

The city of Washington is the flower-bed of sculpture. Its treasures have been lavishly added to in the past few years and continue to be added to. Many of these are free-standing statues—sculpture *per se*—and many are in conjunction with buildings, where there is met the problem of blending together two great arts.

The question always arises as to whether the façade of a building is the proper place for



sculpture. No doubt there is a flavor added to any structure by the addition of the inspired work of a sculptor. But even when one views with approval and appreciation such an embellishment, there is often the feeling that the building composition as a whole has got out of hand. The question cannot but arise that some one has stolen the show from the architect, that there has been too rich a concentration of dollars in sculpture, which would have spread out to buy a great deal of architecture.

There are times when sculpture becomes an inherent part of the building. The Shakespearean groups at the Folger Library in Washington are homogeneous with the façade, actually seem essential. It may be because they are

Here are some of the Folger Library groups, placed where one can enjoy them at eye level, near at hand or across a strip of greensward. The architect, Paul P. Cret, and the sculptor, John Gregory, have put them where they can be savored

in proper sculptural position, as being on the line at eye-level, and therefore capable of being savored without neck-strain, as every piece of sculpture should be.

In this connection, comment may be made that probably the Elgin marbles have been more enjoyed and appreciated in their museum position than they ever were on the Parthenon frieze, unless the Greeks were much stronger in the cervical vertebræ than one would imagine.

For years I have looked at the beautiful Massey Rhind groups skied in the pediments of

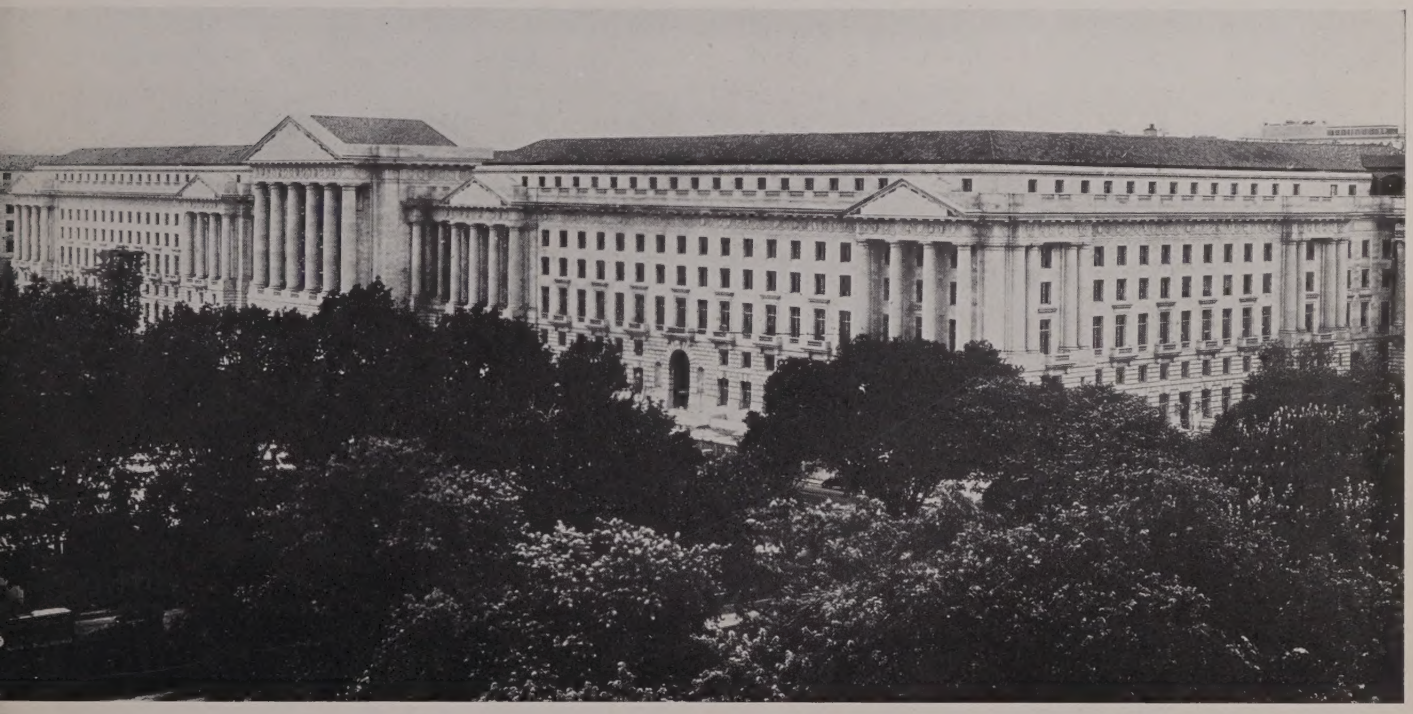
the old Agricultural Building wings, and thought that they deserved to be down where they could be looked at instead of hung on a nail near the ceiling. If they served to enrich the entire building composition, instead of a small part of it, we would not be disappointed to have them waste a great part of their sweetness on the desert air by being out of range.

But even though they are not easily readable as sculpture, such groups set up an elaboration of pattern that tends to steal the show from the architect, by setting a key of high ornamentation too rich for the building to follow.

This is especially noticeable in the structures

how to highhat this fine simplicity. It may be my own personal reaction to it; but as I pass by these buildings I cannot but feel sympathetic. The architecture before impressed me as being nearly perfect—a thing to boast about. After the completion of the sculpture, the key has been set too high and the simplicity, instead of being perfect, becomes inadequate. I dislike to be sorry for buildings that I have so great an affection for as I have for the Washington buildings.

It is such a pity that this fine sculpture could not have been on the ground where it could have been viewed and enjoyed. Where it is, it is out



The Triangle group for Labor and Interstate Commerce, designed by the Supervising Architect's Office and Arthur Brown, Jr. The five pediments bulge with limestone awaiting the sculptor's chisel

in the Washington Triangle. The keynote of these has been simplicity and restraint. There is almost an ascetic absence of ornament. After living with them and watching them grow for a number of years, one develops an affection for them based to a great extent on their unassuming dignity, their lack of stone fruit, flowers, and foliage. The achievement of this group has been that, though it is imposing and awe-inspiring in its magnificent extent, its message has been couched in such simple terms that it has an appeal which, because of its unassumingness, grows upon one day by day, month by month.

The sculpture, beautiful as it is, seems some-

of range. One does not preferably look at etchings from the other side of the gallery, nor at a beautiful actress from the last row of the top balcony. I wish some one would tell me a good vantage point from which to look at a sculptured pediment, into which a great artist has put his soul, but which is placed at a sixth-floor level.

A bit of sculpture hung thus, a couple of light-years above the street, loses its symbolism. On the Fifteenth Street side of the Commerce Building, to cite an example of this, there have just been set four carved pediments. They are fine examples of composition and, from the

worm's-eye view one gets of them are apparently well modelled and beautifully simple in presentation. But the naked eye does not grasp their theme.

The casual observer would offhand ascribe to them, as a series, any of the well-known quandilogies as: Fire, Water, Air and Electricity; or Faith, Hope, Charity and Arithmetic. But there could be no certainty of correct guessing.

An experiment was tried with several persons, who were of a virgin mind on the subject, having no inside information as to the symbolism involved. They were asked to walk from north to south and ascribe possible titles to each pediment. The first was usually guessed to be Fisheries, because the observer knew the Bureau of Fisheries was housed within and the pediment expressed quite evidently, from the street level, the idea of Volga boatmen hauling in their nets. But when the observer reached the second pediment, fish and dolphins leaped sportively in the corners, giving the lie to the first guess.

The scheme then was to start again from the point of beginning, with the conviction, derived from the fish, that there was some easily recognized object in each composition that gave the whole thing away, and let you right in on the secret. But this was a fallacy. In the end the findings concerning the symbolism of the four pediments were usually summarized in the words: "The second pediment represents the Bureau of Fisheries."

I believe I am violating no official secret when I set down here the information that the four pediments from north to south represent in the order named: Commerce, Fisheries, Aeronautics, and Mines.

Had these groups been set on the ground, or had there been places arranged for them on the building within eye-range, they would have been precious and uplifting. The cause of neither architecture nor sculpture is advanced very much by them in their present remote locations.

The design of the pediment sculpture on the Supreme Court Building goes to prove the idea that such a group need carry no special message. This pediment follows the Sistine motive, of placing contemporary portraiture in a more or less allegorical or symbolic composition. The Sistine Madonna bears the portrait of Pope Sixtus, although it is a known fact that Sixtus was not alive in the period so closely following the Immaculate Conception.

The Supreme Court group, similarly, carries portrait sculpture of Chief Justice Hughes, Elihu Root, the sculptor Mr. Aitken, and the architect Mr. Gilbert. Just what sort of sculptural allegory could be expressed only by the inclusion of these four individuals is hard to understand, but that is not the salient point.

The matter that comes to mind is that if such a group on the ground within close inspection range purported to visualize a majestic idea concerned with the power of the law, and used more or less contemporary and ill-assorted citizenry to convey this grandiose idea, the group would become ludicrous.

In a high pediment, out of range save for general effect, the sculptor felt he could do anything so long as the group fitted the space. He could say the composition represented Law, or Justice, and would be perfectly safe in making the *dramatis personæ* therein contain movie girls, gunmen, football heroes or whomsoever he pleased, since only the telephoto lens is able to get the message.

It is believed we ought to place more sculpture on the ground or at eye-level and less of it among the stars. To return to the glorious panels on the Folger Library: here within range are achievements that, because they are works of genius and can be viewed as such work should be viewed, will forever be a joy.

Sculpture is emotional with an appeal to the depths of one. It is full of sentiment, of friendliness. We are all of us grateful for it, but we get the greatest pleasure out of the companionable groups and figures which are near to us. The attic sculpture is remote. We are apt to think of it as another haven for birds. We view it with a wistfulness as not being of our world.

Perhaps one should not show irritation that great works of art are placed in localities where their power is lessened. Perhaps one should be thankful that they are there at all. But when we are so fortunate as to have ten or twenty or a hundred thousand dollars to spend on sculpture, may I put in my prayer that if possible it be placed at grade, with grass about it, and foliage for entourage, so that when one plods to work in the morning, gloomy with the thought of indoors, he can take an uplifting message with him?

I sometimes wonder, too, if these sculptors do not let their minds stray from the matter at hand. Isn't there a tendency to forget that they have set up an alliance with architecture and that the result of their effort should not be sculpture alone but sculpture adorning architecture?

One of two pediments at the 13th Street ends of the Delano & Aldrich Post Office Department wings. These (the other at bottom of page) carry out the architectural balance of the composition; each has a sphere as central motive. Adolph A. Weinman, designing sculptor; Sydney Waught, collaborating sculptor

Adolph Weinman's pediment over the middle recessed entrance to the Post Office Department Building. The central figure represents the light of civilization and progress. On her right is Youth, on her left, Mercury

The south pediment of the pair on the ends of the curving wings of the Post Office Department Building, also by Weinman and Waught

Seated figure flanking the south entrance to the Archives Building. James Earle Fraser, sculptor. Office of John Russell Pope, architect

Is it sufficient to model a well-considered group to fit properly in a low triangle and give no consideration to its coherence with anything outside that triangle?

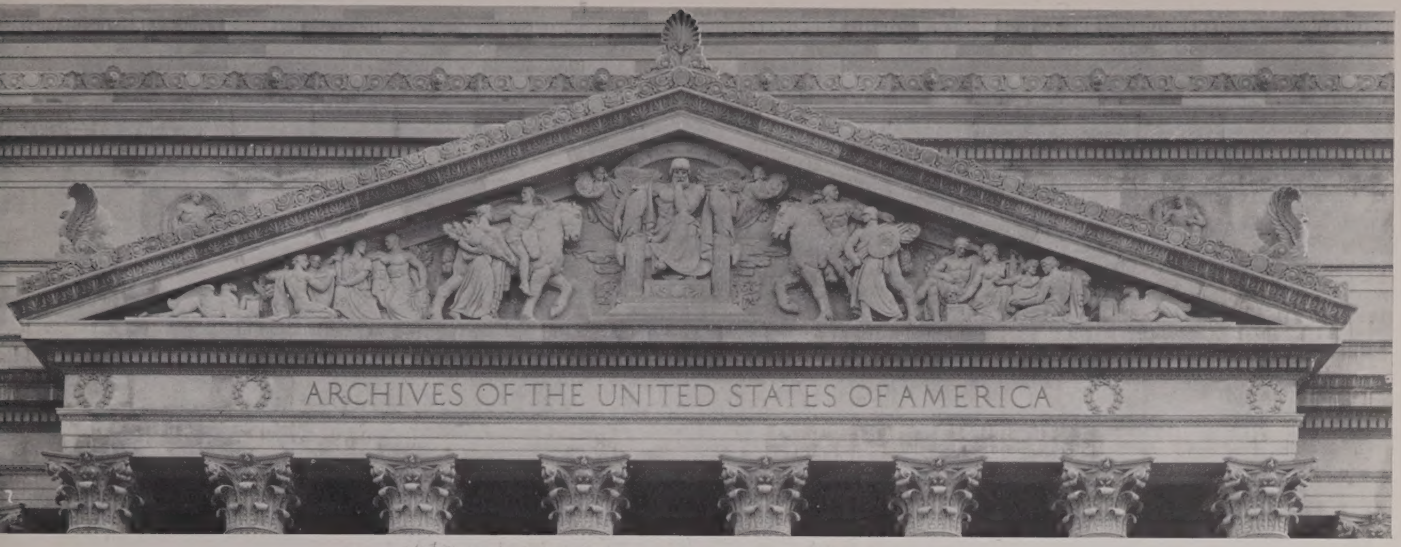
Consider the beautiful sculpture of the south pediment of Archives. Beautiful indeed, inspired—but not blending with the architecture! It rather seems to be reaching out to steal the show—a solo singer making it difficult for one to hear the fine harmonies of the rest of the chorus.

Note that where the sun falls on the south pediment, although this is the decoration of a flat surface, all of the surfaces of the decoration are rounded. There is no recall of the structural surface they decorate. There is no flat vertical plane, however small, acknowledging that this sculpture is an embellishment of a fine, dignified architectural surface.

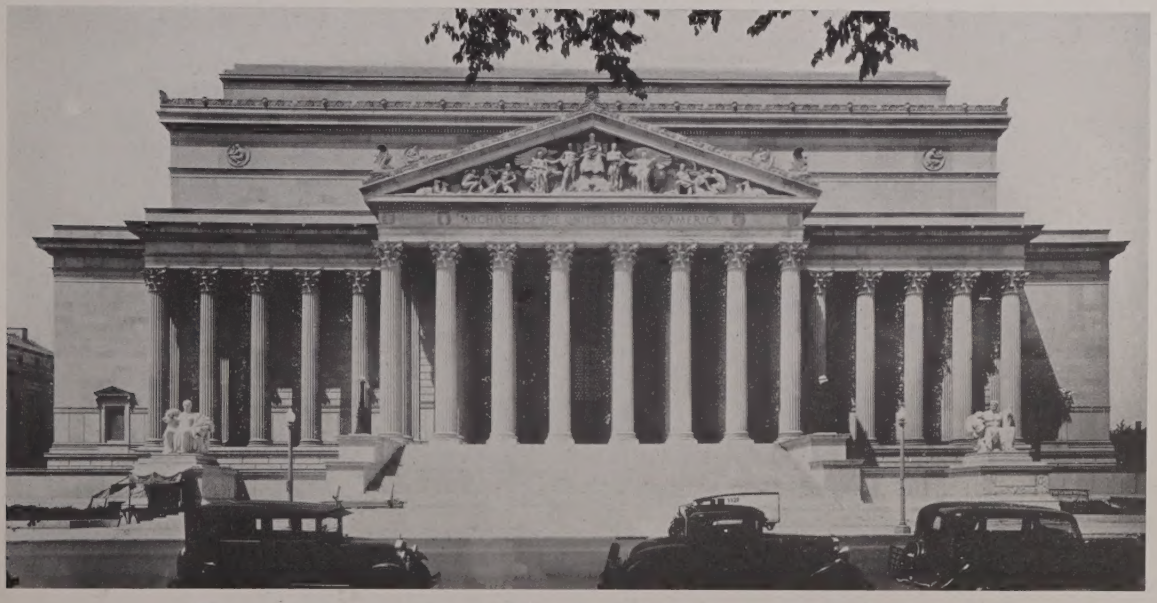
There is rather just a suggestion of condescension, as if the sculptor, whether from reasons of superiority or of conscience, deigned to elevate a minor art by the superimposition of the major one of sculpture.

Note how much more comforting is the north pediment. There is no sun here to make one conscious of the rounding surfaces. Without shadows, they show flat. One is soothed and uplifted by their tympanum-like quality, as if they were actually figures in relief against the architectural surface they decorate. Seen from the far side of the great open space before the building, the pediment is splendidly monumental. It reads as architecture as well as sculpture.

North entrance, Archives Building. Robert Aitken's sculpture is expressive of wall surface and is where it can be seen

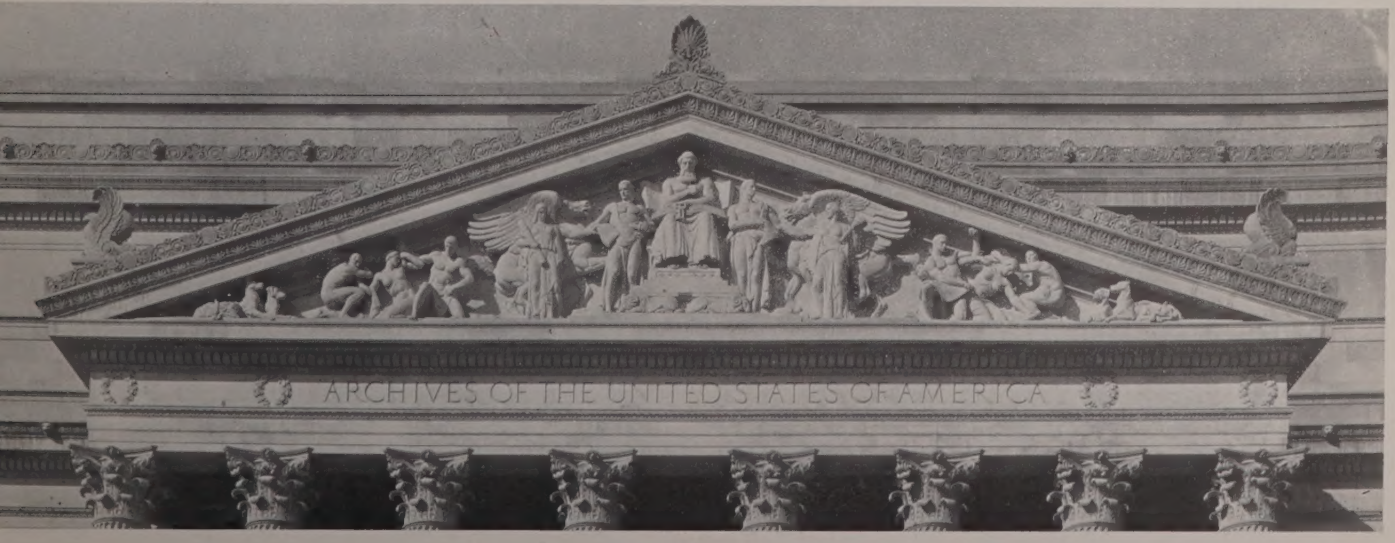


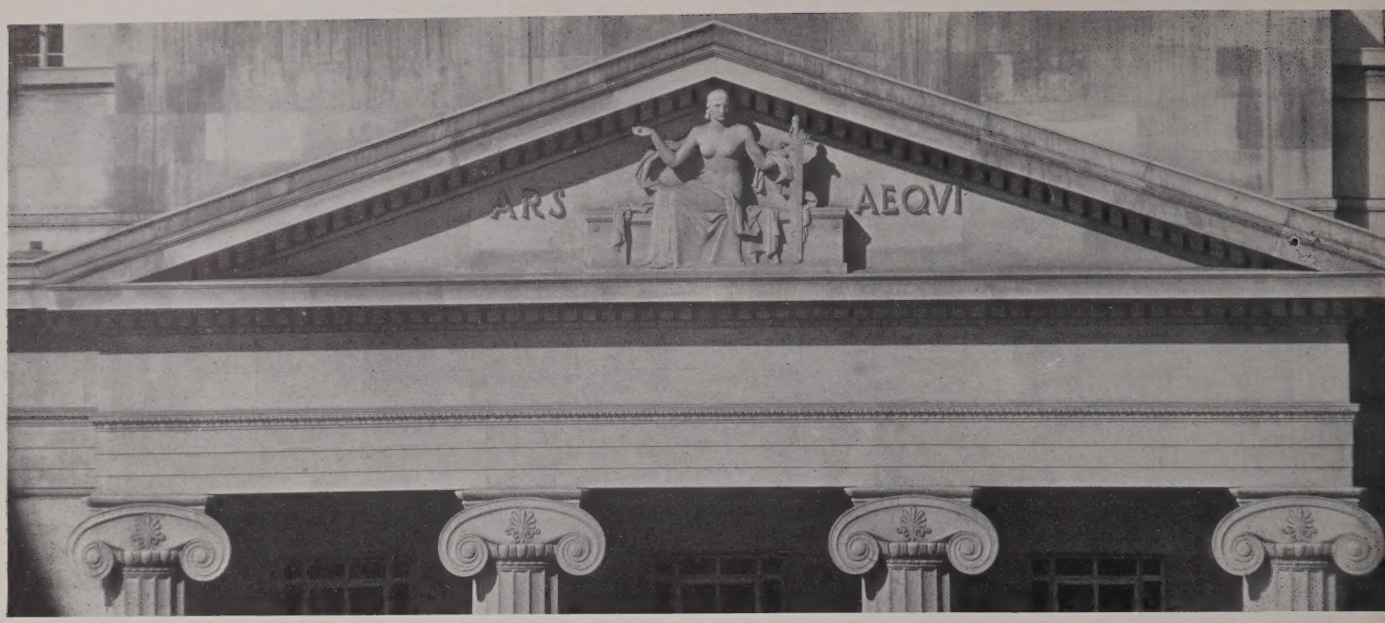
North pediment of the Archives Building. Adolph A. Weinman, sculptor. Office of John Russell Pope, architect



The south front of the Archives Building, showing the relationship of the sculpture in pediment and seated figures to the building as a whole

Below is a close-up of this pediment by Adolph A. Weinman





Southwest pediment on the Department of Justice Building. C. Paul Jennewein, sculptor. Borie, Zantzinger & Medary, architects

The sculpture on the Department of Justice Building, combined as it is with architectural lettering, tones in quite well with the building. In addition it is, as revealed by the telephoto lens, very charmingly conceived.

Architecturally there has been considerable criticism of the figures at the north entrance to the Archives Building because of the fact that they seem to spread and flatten out the entrance. As pieces of architectural sculpture, however, they are excellent. They are expressive of the wall surface they adorn and they are in position to be seen.

There is a fine feeling for architecture in the Gregory groups at the Folger Library. They are unmistakably decorations of the architectural surface against which they rest and with which they form an alliance. There is no suggestion that the architecture is a background. In each of the groups there is a dominant figure the plane of which is sympathetically parallel with the wall, so that one has the soothing feeling of an amalgamation of sculpture with architecture.

But I think, to be truthful, one must assert that that seldom occurs. The sculpture usually sets too fast a pace, the urge of the sculptor to key his stuff up being aggravated by the fact that he finds the space allotted him is in a position of poor visibility; and this forces him to overemphasize his carving to get any attention for it at all.

The question certainly must arise in the mind of every architect who turns over a part of his building to a sculptor: "Am I wise in permitting so much of the money which is available for the building to be paid to a sculptor whose work tends to belittle rather than enhance my architecture? Am I quite sane in that?"

Isn't it possible that better monuments would have resulted in most cases if the architects had allocated the money that was spent on sculpture to the purposes of architecture?

One of two things seems to be necessary. First alternative: The architect should omit sculpture and produce a finished project all in his own art without uncertain alliance with a person of any other art. Second alternative: The position of the sculpture, if used at all, should be less stereotyped and more readable, and the sculpture should be architecture first and sculpture afterward.

Either way the money would be well spent.

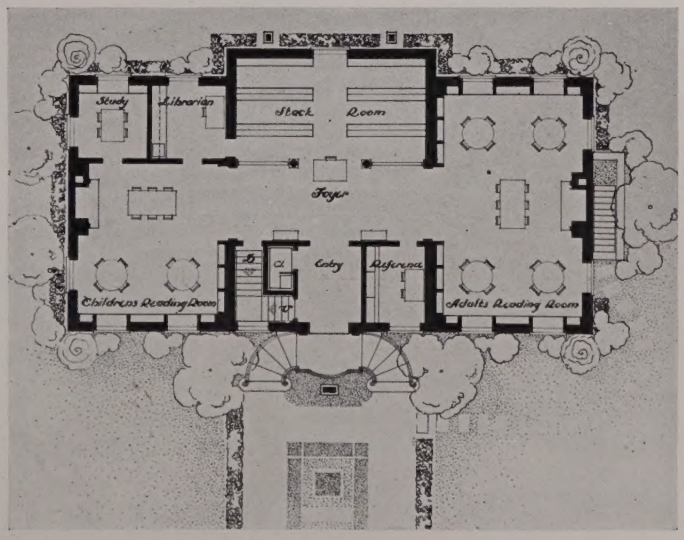
Below is Adolph Weinman's figure "Night," from the frieze of the Post Office Department Building

Photographs by Richard Garrison

The building is situated in a country town of about two thousand population. For the plot there was available about an acre, facing on the main street, and the building has been set back sixty feet to allow for proper approach and planting.

At present the capacity of the library is twelve thousand volumes. As will be seen in the plan, however, the stack room is located in a wing at the rear, which could be easily extended.

The plan is predicated upon the idea that the building would be in charge of a single librarian, who would spend part of her time in the repairing and binding of books. From the central desk supervision is easily maintained, while in the small office and workroom, she is still readily accessible.



The interior is arranged so as to give almost the effect of one large room, while providing a main reading-room at the south end, and a children's reading-room at the north end. There was also required a small room where students and older children could carry on research work without being disturbed. In the basement, which is partially above grade, there is a large room for lectures and art classes with a separate entrance.

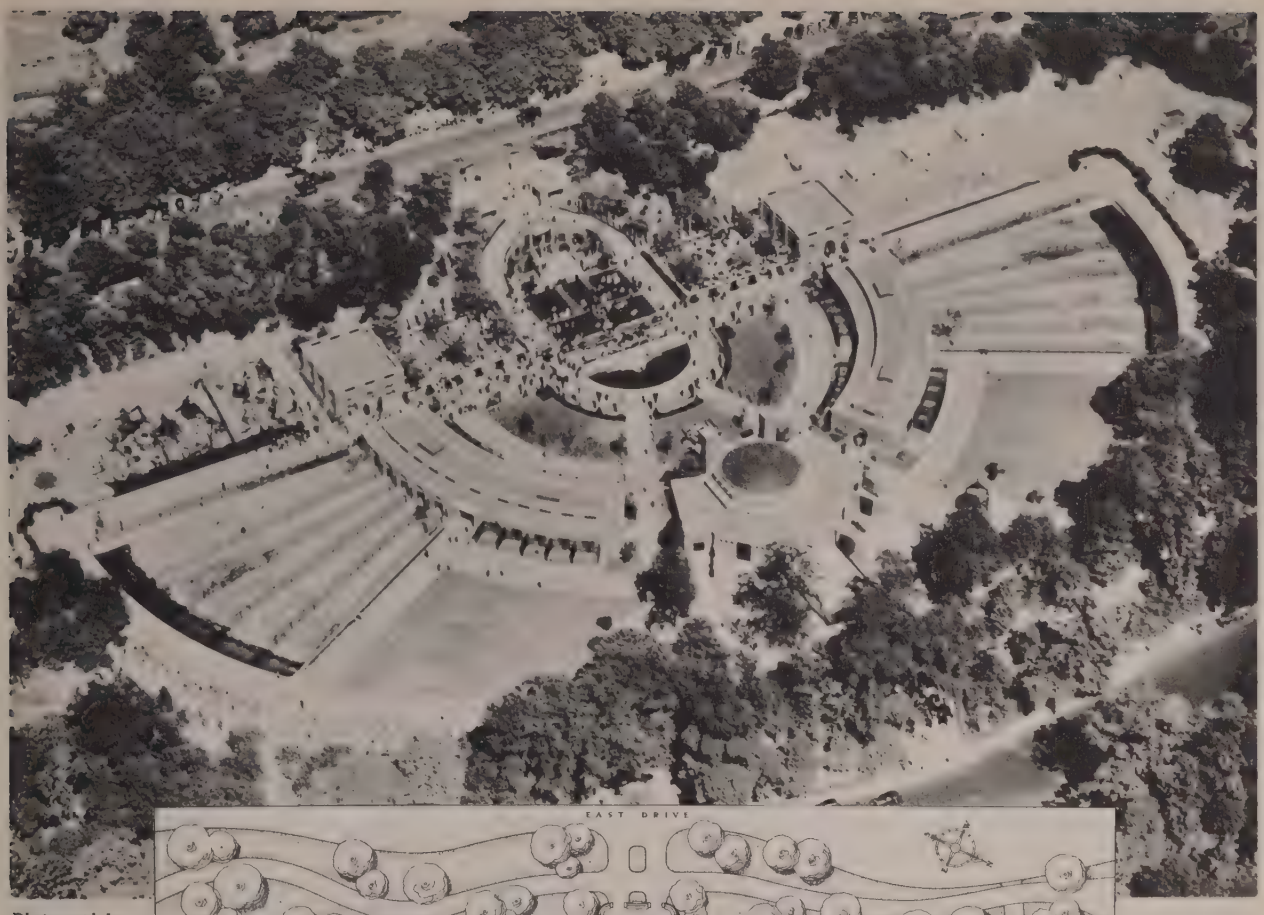
ERARD A. MATTHIESSEN
ARCHITECT

Cornwall Public Library, Cornwall, N. Y.

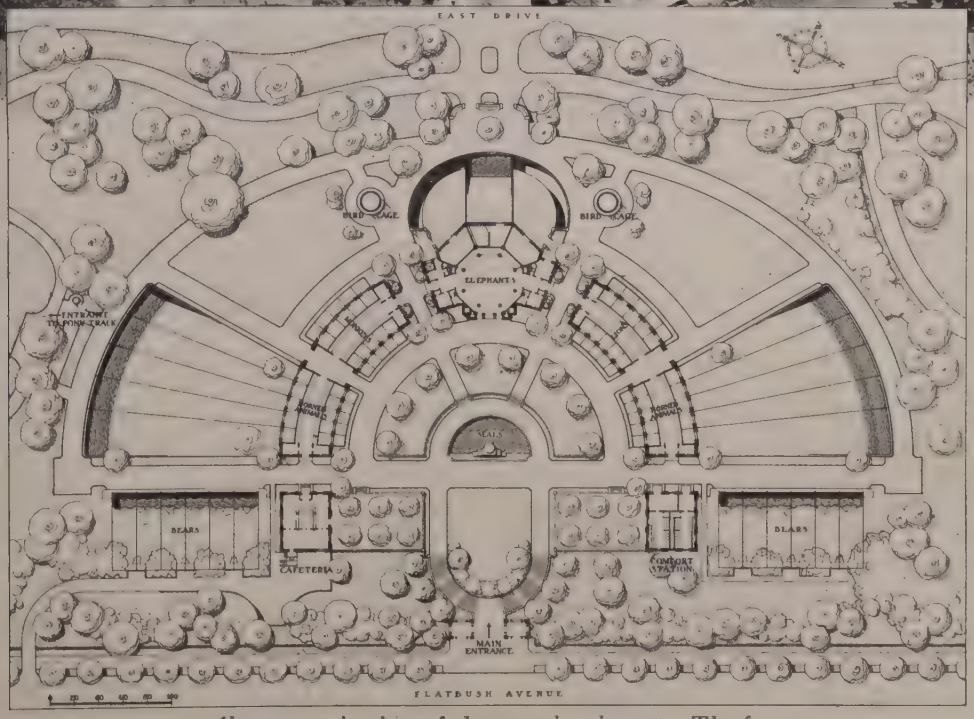
On the main floor, the rooms are finished in panelling of white pine, selected so as to be free from knots, and stained a light color. The floors are of cork tile

The building is of solid brick construction, the outside being faced with selected dark-red Hudson River common brick, laid up in Flemish bond with the mortar tinted black

In the main rooms the hangings have a background of rust color with a flower pattern of greens and blues. Venetian blinds, which disappear into pockets when not in use, are a pale green, and this note is carried out in the fireplace facings of Verde Antique marble



Photograph by Rudy Arnold



Above, an air view of the complete layout. The fan shape of the plan is an ingenious arrangement, permitting observation in indoor cages and outdoor runs

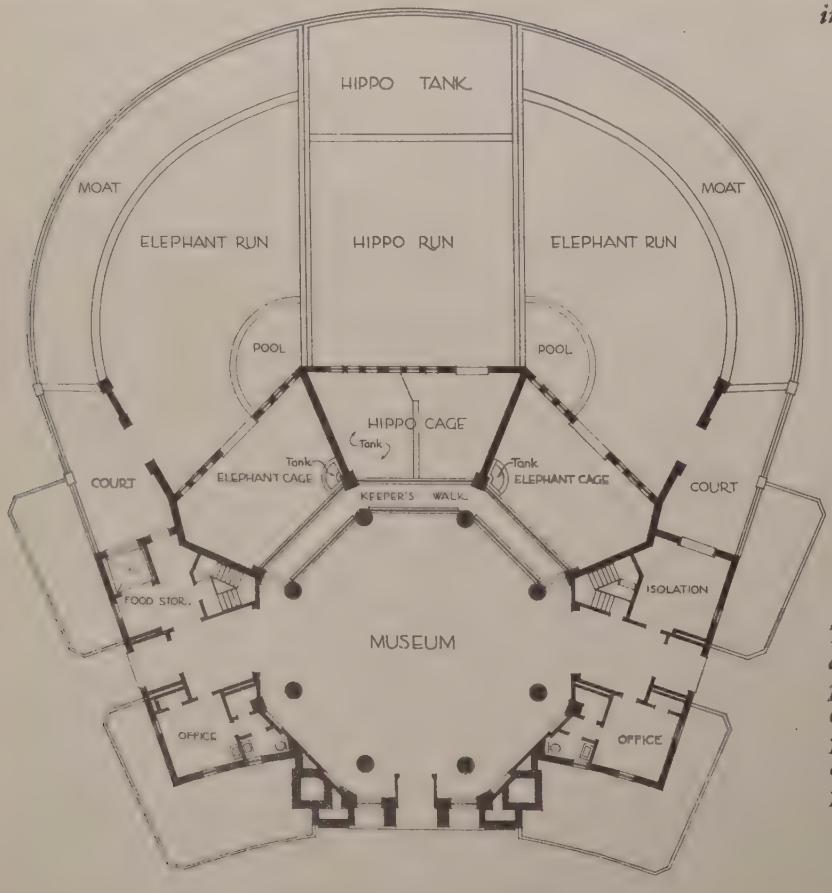
THE CITY OF NEW YORK, DEPARTMENT OF PARKS

ROBERT MOSES, Commissioner AYMAR EMBURY II, Consulting Architect GILMORE D. CLARKE, Consulting Landscape Architect

The Brooklyn Zoo

Photograph by Robert W. Tebbs

A view of the group from the center, showing the elephant house and museum as a dominating element



PLAN OF MUSEUM AND ELEPHANT HOUSE

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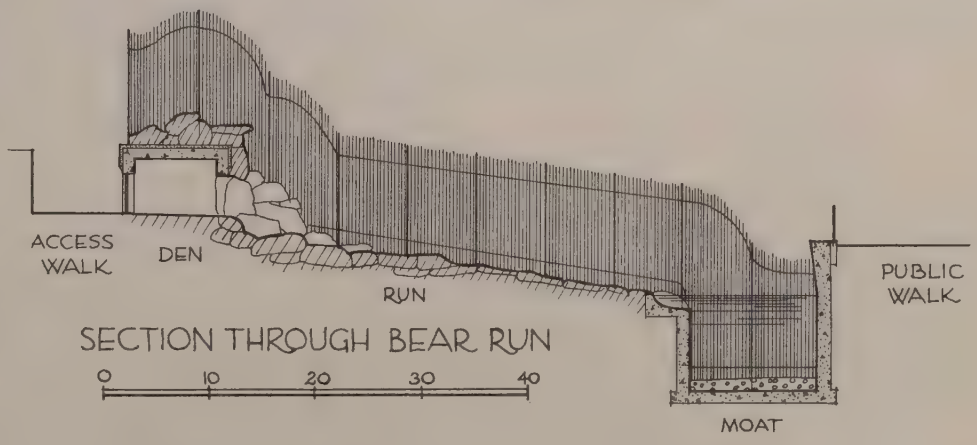
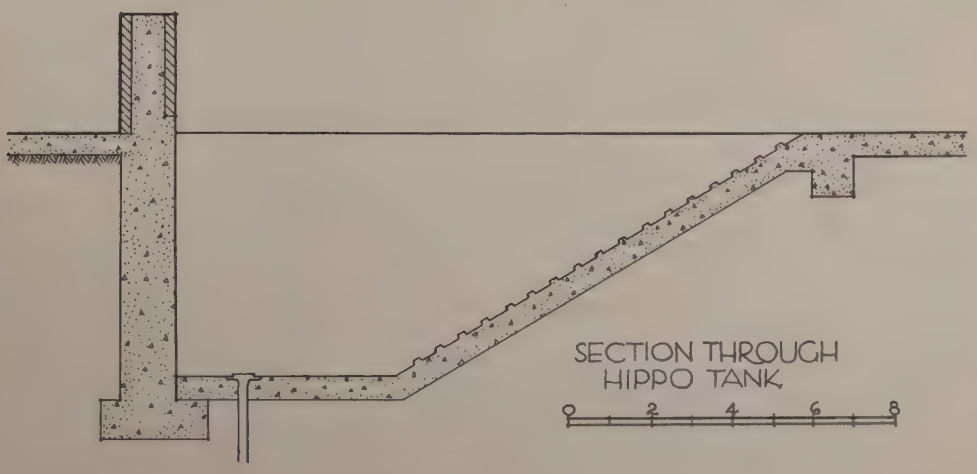
The plan of the central museum building and elephant house carries out the same purpose as that marking the whole layout, namely, to provide inspection for the public of the animals inside the building and also in their outdoor runs. The elephants, it will be noticed, have outdoor pools, and the hippopotamus, a tank

Photograph by Robert W. Tebbs

The rear of the elephant house, showing one of the elephant yards with its pool against an angle of the building. There is a ten-foot moat between the animals and the public space



For the bear runs, the working drawings necessarily left a wide latitude for the judgment of the workmen and foreman in disposing the rock masses

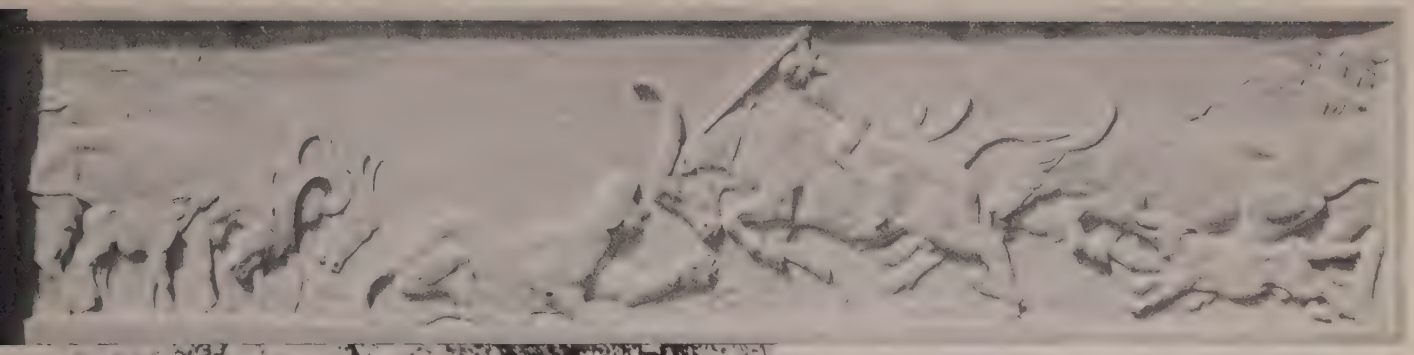


The hippopotamus tank is ten feet deep from the finished floor level of his outdoor run, with a ribbed slope ten feet long down into it

Photographs by Robert W. Tebbs

A quartering view of the museum and elephant house, built of selected common brick with a flat dome of Guastavino tile

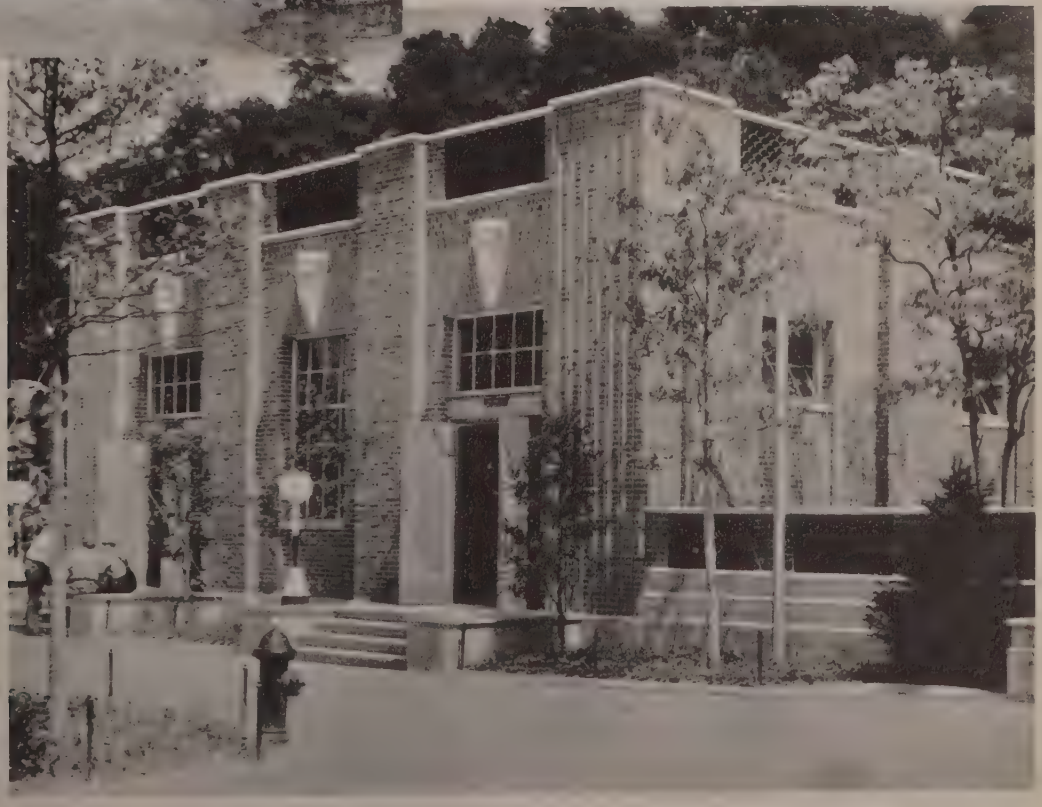
One of the wings flanking the museum building and elephant house. The left half of it is given over to horned animals and the right half to monkeys



Aside from some simple ornamental forms in the common brick work itself, a few sculptured panels in limestone accent focal points. "The Fight," Anton S. Brants, sculptor

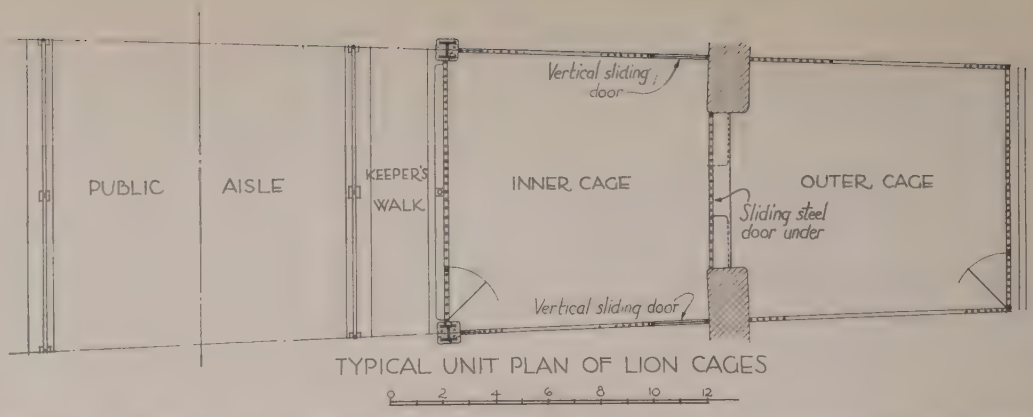
A detail at the entrance. Molded brick is used in the piers. The lioness and cub, in bronze, are the work of Frederick W. MacMonnies, sculptor

The comfort station at one end of the semi-circular plan. Corresponding with it at the other side is a cafeteria building. Sculpture by Frederick G. Roth



Photographs by Robert W. Tebbs

In the typical unit plan of the lion cages it will be noticed that between the public space and the inner cage there is a walk, sunk 2' 6" below the level of the cage floor, serving both for access to the cages by the keepers and as an isolation space



TYPICAL UNIT PLAN OF LION CAGES

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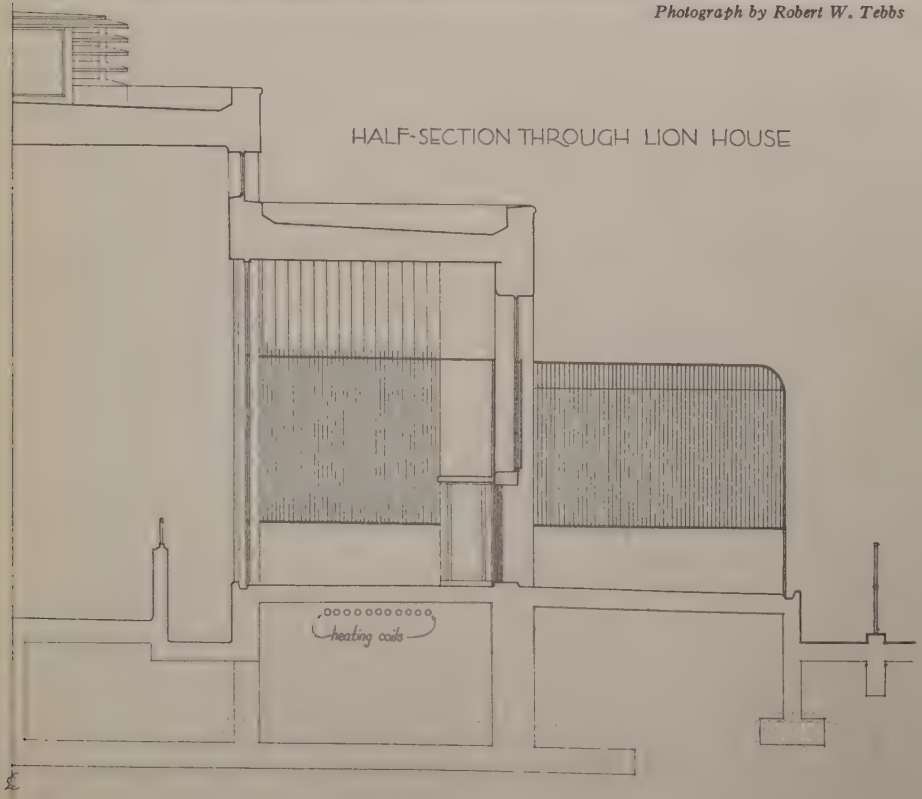
Photograph by Robert W. Tebbs

A detail of one of the wings, with its very simple outdoor cages of wrought iron



HALF-SECTION THROUGH LION HOUSE

A great part of the success of the zoo as a workable plant depends upon the relationship of the various levels shown in this half section. Note the sleeping-shelf in the inner cage, under which is a solid steel door. The floor is heated from below

INDUSTRIAL DESIGN

Mechanical Technology of Metals

By D. C. O'Connell

We have taken occasion before this to point out the fact that, in the present state of civilization here in America, the architect is the designer—not merely a designer of buildings but a designer in the broadest sense. In no other profession does the whole course of education and experience lead so directly to a development of the analytical mind as it relates to the correlation of function with form and color, and to a knowledge of materials, processes and structure.

—EDITOR.

THERE have been a great many articles written on Industrial Design, but most of them have concerned themselves only with the æsthetic qualities of the finished product. They offered little information to the person who had never done any product design. This series is intended for just that person, especially the architect who contemplates doing something in industrial design. We hope to provide some of the more elementary information that may be needed. This is not to be an exhaustive study of every phase, but more or less an outline of the materials and processes with which the designer has to work.

Selecting metal as the subject for this first article is justifiable in view of the fact that more products are designed in metal than in any other material.

A study of metallurgy or the specific qualities of metals is not necessary for the designer. He will find a good practical knowledge of metals and their uses sufficient. What he cannot know too much about is processing. With a sound knowledge of the different operations in manufacturing a metal product, or any other for that matter, he will find himself in a better position to help solve the manufacturer's problem.

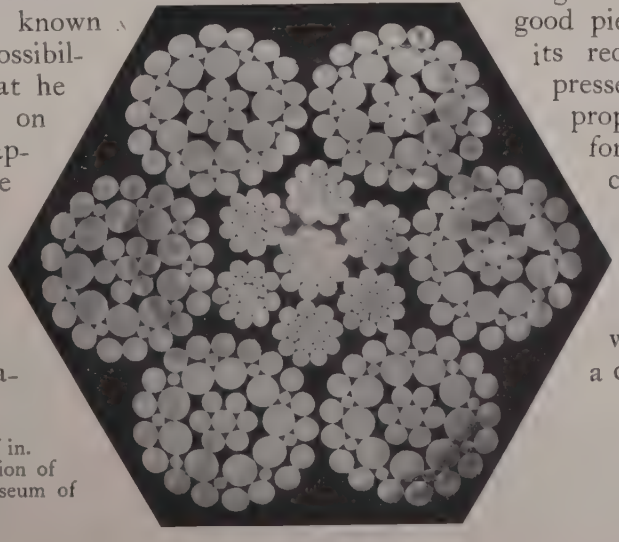
The manufacturer does not expect scintillating engineering feats from a designer. He usually has a corps of engineers who know all there is to be known about the mechanical possibilities of his product. What he is interested in are ideas on how to improve the appearance and reduce the cost of his product, using the equipment he has in his plant. The designer must keep in mind, as he designs or redesigns, what he can do to reduce operations and prevent new tooling costs. He must know whether a stamping or a spinning will do the job cheapest and best. He must consider the sales life of an article before he recommends an additional operation that entails added expense.

The metal and process used will, in a great measure, determine the character of the design. Taking a stamping as an example, the necessary radius at the corners, instead of a crisp edge, will lead the designer into studying his design as a stamping rather than as a design for any process. The combining of one metal with another, and with other materials, is also a factor in determining the final design.

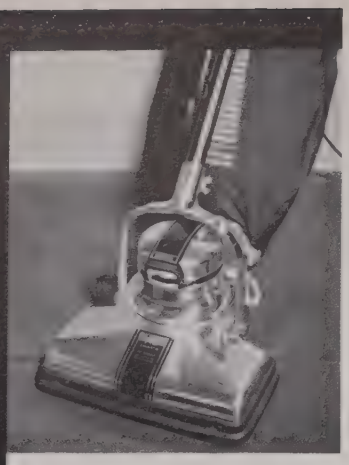
In the accompanying illustrations, we have taken a recently designed product and shown it in its proper classification with a description of the process in its simplest form. Although in no way a complete mechanical technology, it is hoped that this will act as a check list for the prospective designer. The architect will find that he is familiar with most of the usual processes but must seek information on the methods used in mass production.

Of all those tutored in the arts and sciences, the one person ideally equipped to fill the requirements of the industrial designer is the architect. It is, however, unfortunate that he has received so little information on the subject. Although some architects have been doing industrial design for a number of years, the majority of them still know little or nothing about the large field calling for their talents.

A good treatise on architecture defines architectural designing as creative thought controlled by fulfillment of purpose, truth of thought and beauty of form. A good piece of architecture has its requirements of use expressed in beauty and suitable proportions, with a regard for the material used. The creation must be practical and easily constructed. This definition can be applied to design in industry, whether it be a boiler or a coffee percolator.



Section of wire rope, 3½ in. diameter, from Exhibition of Machine Art, The Museum of Modern Art, New York



Designed by Henry Dreyfuss
for the Hoover Company

CASTINGS

TYPE	PROCESS	METAL
Green sand	Patterns usually made of wood	Iron
Dry sand	Sand hand rammed	Steel
Loam	Green sand for rough castings	Brass
	Dry sand for finer castings	Bronze
Machine	Loam mouldings require no patterns	Copper
Moulding	Metal patterns in gangs	Aluminum
	Sand rammed by machine	

Designed by Walter Dorwin Teague
for American Sales Book Co., Inc.

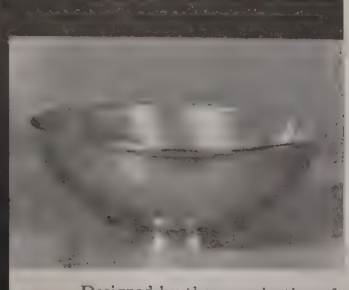
DIE CASTINGS

TYPE	PROCESS	METAL
Slush	Permanent metal moulds	Alloys of
Pressure	Hollow or solid	Lead
Gravity	Molten metal poured or forced into	Tin
Centrifugal	mould	Antimony
Corthias	Entirely automatic	Copper
		Zinc
		Aluminum
		Nickel
		Magnesium
		Silicon

Designed by Norman Bel Geddes
for Standard Gas Equipment Corp.

STAMPING & DRAWING

TYPE	PROCESS	METAL
Single-acting press	In single-acting form, blank is placed between punch (slide) and die (matrix). Punch descends, forcing blank into shape of die	Thin sheet metal
Double-acting press	Double-acting press has inner and outer slide—outer slide holding flange or blank against die while inner slide depresses it	Tin
	Worked cold	Brass
		Copper
		Iron
		Aluminum
		Silver
		Steel

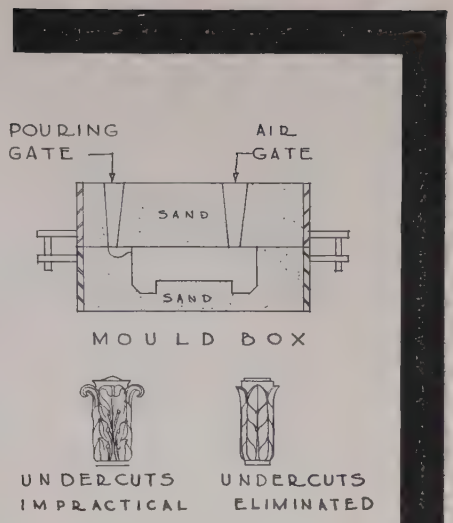


Designed by the organization of
Graff, Washbourne & Dunn

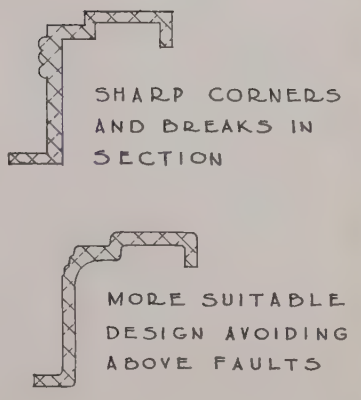
SPINNING

TYPE	PROCESS	METAL
Solid chuck	The desired shape is first turned in wood which then becomes the chuck against which, while it rotates, a metal blank is pressed by a manually operated tool	Thin sheet metal
Collapsible chuck	For shapes with necks smaller than the body, collapsible chuck is used	Tin
		Brass
		Copper
		Aluminum
		Silver

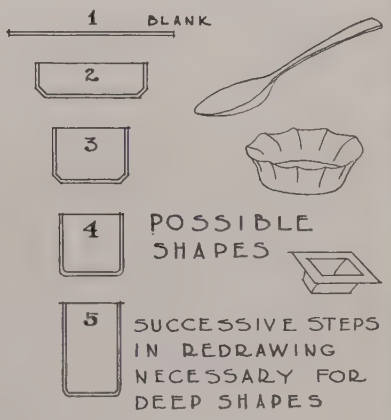
NISHING	USES	LIMITATIONS
ough when taken from mould eaning necessary evolved in barrels mmersed in acid nd-blasted ot-blasted r final finish— Machined Polished Enamelled Plated Painted	Decorative Bases Mechanical parts Housings	Best for large pieces and limited quantities Must draw from mould—avoid undercuts



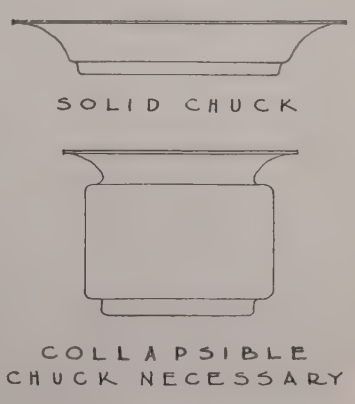
NISHING	USES	LIMITATIONS
hen taken from mould casting is correct in form and dimensions with holes, inserts, and threads ery little machining necessary nal finish— Polished Painted Plated	Toys Types Appliances Mechanical parts Housings	Best for mass production Dies expensive Number of castings must exceed a certain minimum Usually small in size Abrupt changes of section, sharp corners, undercuts, and thin walls to be avoided



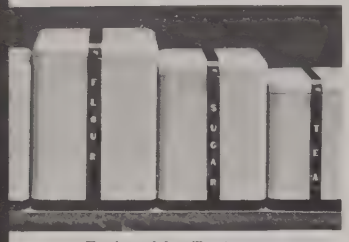
NISHING	USES	LIMITATIONS
inted namelled lished ated	Kitchenware Housewares Decorative objects Light mechanical parts, such as clock works Accessories Coining	Can be round, rectangular, or polygonal Limited size Die cost expensive No undercuts Several operations necessary for deep drawings



NISHING	USES	LIMITATIONS
inted namelled lished ated	Kitchenware Housewares Decorative objects Accessories	Usually circular Oval shapes possible Spinnings with opening or any part smaller than body possible with collapsible chucks, but involved—more costly



Designed by Lurelle Guild
for Kensington, Inc.



Designed by Engineering Dept.
and Geo. M. Walker for
Watts-Morehouse Mfg. Corp.

Designed by Walter Von Nessen
for Chase Brass and Copper Co.

Designed by Prof. F. A. Breuhaus
for Thonet Brothers, Inc.

Designed by [illegible]
Hurley Machine Co.

EXTRUDING

Metal is cold-drawn through a die, as in wire making

The sections can be almost any desired shape, but limited in size to less than a foot; also tubes of any shape

Brass, bronze, aluminum

Structural and decorative

SHEET METAL WORKING

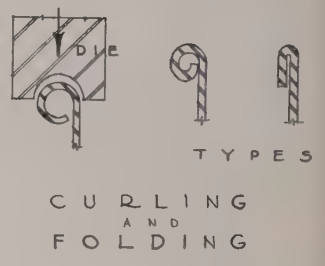
The manufacturing of sheet-metal products most commonly calls for folding, seaming, and "breaking" metal

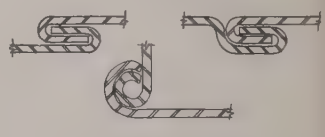
Folding is usually done on the edge of a cylindrical shape, although it is possible on a rectangular one if the corners have sufficient radius

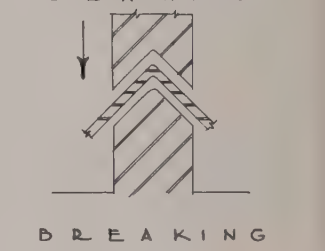
Seaming is done only on the lightest of metal, acting as the joining seam for the ends of a sheet that has been bent to shape

"Breaking" should rightly be called bending; it is the usual way to form a corner or angle; the corner is, however, never sharp, always having a slight radius

Houseware, kitchenware, containers

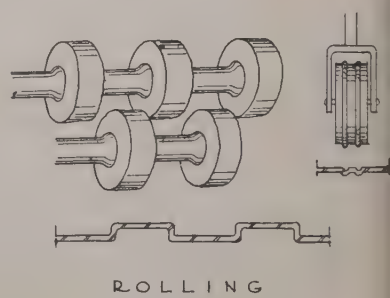






ROLLING

Rolling in lighter metals is usually used for decorative purposes, but the operation is similar to that used on heavy structural shapes



BENDING

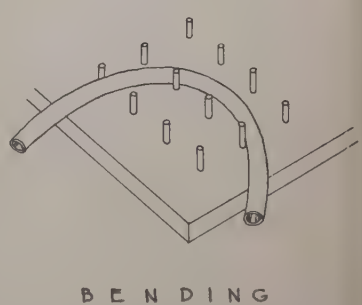
Bars and tubing, either round or rectangular, are bent, usually cold, on the bending-table

Tubing is first filled with sand so that it will maintain its form during the operation

On some metals annealing is necessary

The radius of the bend is limited by the size of the bar or the tube and by the metal

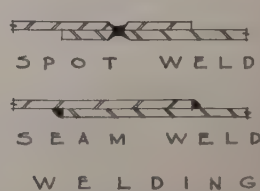
Furniture



WELDING

In mass production the necessary reduction of operations, such as tapping and dieing, makes welding a necessity

In light metals, spot welding can be so finely controlled that the welds are hardly visible on the finished product



OPUS SECTILE *in* GLASS

By Eugene Clute

Photographs by Monroe Carrington

OPUS sectile is seen frequently in tile, for much of the finest work in that material is in this manner, notably some of the most beautiful old Persian tile work. But opus sectile in glass seems to be rare. Only a few examples are known to the writer. They are essentially different in technique and appearance from the familiar kinds of mosaic.

The distinguishing characteristic of opus sectile is that, whatever the material may be, the design is always composed of pieces shaped to conform to the outlines. The mosaics shown here are not made up of small rectangular tesseræ, as most mosaics are, but of pieces of glass, of the kind used in leaded glass windows, cut to follow the outlines of the parts of the design, beautifully enriched with detail and with varied color by methods that display a thorough mastery of the glass worker's art. They are set in a white mastic backing that reflects the light through the semi-transparent and translucent glass, giving the work marvellous luminosity and vibrancy of color. These mosaics were received in the form of completed slabs ready to install.

Since the designs are not broken up into innumerable tesseræ, opus sectile mosaic is especially suitable for use in chapels, baptistries, and other of the more intimate interiors, where they are seen close at hand. When, as in these mosaics, the pieces of opus sectile mosaic show finely executed elaboration and countless nuances of color, the effect is very fine. In their fullness of statement and refinement of detail these mosaics resemble paintings, but their composition from pieces of durable material, forming part of the wall surface, is sufficiently evident to give them architectural character.

Reredos, Chapel of the Beloved Disciple, New York City. Mayers, Murray & Phillip, architects. The glass mosaic executed by James Powell & Son

The photograph at the head of the article shows the mosaic panels in relation to the exquisitely carved Caen stone of the reredos. The principal group of three panels shows the Madonna and Child, a figure kneeling in adoration before them and, at the right and left, in the flanking panels, an angel choir.

Above, in the center, is a panel of vesica pisces form (the fish-egg shape symbolic of the renewal of life) in which is a representation of the Risen Christ. At the right and left, in

smaller panels, are seen attendant angels. The six small panels across the lower part of the reredos bear Christian symbols.

The coloring of the right-hand and left-hand panels of the group of three is developed in countless shades and tints of ruby, garnet, pomegranate and plum, through which there is the gleam of gold, against a background of warm golden browns and soft, warm, old rose tones that give place to rich greens mingled with gold at the bottom of the panels.

In the central panel, against the background of golden browns and amber tones, is a hanging of translucent ruby over gold, ornamented in gold, and edged with green and gold, back of the figures. At the bottom tiny plants and flowers are seen in a field of green and gold.

The orchestration of color rises from the rich golden brown, green and ruby tones of the side panels, showing the angel choir, to the higher color notes of light plum, blue and white in the representations of the Blessed Mother and the Child Jesus. As undercurrents are the warm tones of gold and the cool gleam of silver, with softly iridescent pearly accents. A close-up view of this panel is given on this page. It suggests much of the translucency and vibrancy of the original, though the beauty of the coloring can be suggested only faintly by the gradation of tones in monochrome.

Central panel in the reredos, in which the draperies are of translucent ruby over gold against a background of golden browns and amber tones

It is interesting to note how the effects described above are produced. As an aid in doing so a close-up of a portion of the left-hand panel is shown (next page), in which the characteristics of the technique outlined below can be seen. The principles are simple, though their successful application is sufficiently difficult to call for the best efforts of the most skilled craftsmen. Briefly, then, the method is as follows: The pieces of glass of which the mosaic is composed are cut to shapes conforming to the outlines of the portions of the design into which they are to fit, with additional joints where they are needed. So far the procedure is very much like that in making a leaded-glass window. The glories around the heads of the figures are of tesseræ, a departure from the opus sectile principle that is warranted.

The glass used is mainly of a special, heavily flashed type of glass, the front of which is of some rich color while the back is of gold or silver glass. This makes possible the rendering of detail and the gradation of tones through etching away the top layer of glass with acid to the required depth. If the top layer of colored glass is etched away completely the under layer is exposed in the etched part. That is what has been done, for instance, where a ruby mantle shows a pattern in gold. By reference to the close-up photograph it will be seen that the robes of the member of the angel choir shown in this picture have been ornamented by this method, the ornament being lower than the main surface of the work. In the wing of the angel the surface of rich, vibrant, blue glass has been etched down to a layer of silver glass to produce the silvery white high lights. But it will be noted also that the density of the blue in the wings varies. This effect is produced by etching away part of the thickness of the blue glass, permitting the silver to shine through more strongly and producing a lighter tone of blue. By grading the thickness of the blue glass, graded tones are produced. This is one of the principal methods used in the production of the mosaics shown here.

The making of this type of glass is interesting in itself. It is blown by a rather primitive old method. The glass blower dips one end of

Close-up detail of a portion of the left-hand panel, the angel choir, showing the effects of partial and deep etching

Close-up detail of the illustration shown on the following page, where the mosaic is set flush in the stone wall

his long iron blowpipe in a pot of molten glass "metal," and gathers a ball of the glass on it. Then, applying his mouth to the other end of the pipe, he blows his breath into this ball of glass until it expands somewhat, forming a thick bubble. Next, he dips his blowpipe into another pot of molten glass, coating the glass already on the end of the pipe with glass of a different color. He proceeds with the blowing until a balloon-like hollow globe is formed, the walls of which are of the required thickness. Incidentally, the glass blower knows a trick to save his breath, for he places his thumb over the mouth end of the pipe after the work is well started, and the air thus confined in the bore of the tube is expanded by the heat and does the blowing for him, swelling the glass bubble to larger size. During the entire process of blowing the glass the blowpipe must be rotated rapidly in order that the centrifugal force may prevent the soft hollow ball of glass from sagging. This the craftsman accomplishes by a sinuous movement of the wrist and hand. This ball is then cut and spread out flat, to form a sheet of glass.

Flashed glass made in the way just described is used very largely in making stained-glass windows, but there is an important difference. It is usually a practically colorless glass with a very thin surface of colored glass on the face side. This is necessarily so, for the completed work is to be viewed by transmitted light and if semi-opaque glass were used for the back of the sheet, as in this mosaic work, or if such a considerable thickness of the colored glass were used on the front, the light could not shine through well enough to bring out the colors.

Since these mosaics are seen almost entirely by the light they reflect from their surface, whatever light may come through the glass by reflection from the white mastic ground in which it is set serves only to give the mosaics luminosity, and the glass need not be transparent but can well be only translucent or even almost opaque. This permits the use of very rich colors and of gold and silver glass flashed with one

color or another. Also, practically opaque opal glass is used for the parts of the design representing flesh—the face, hands and feet of figures.

The general practice in etching flashed glass is to apply asphaltum or similar protective coating to the parts that are not to be affected and to do the etching with hydrofluoric acid.

In these mosaics, the features of the faces, the shading on the parts representing flesh, the hair, and other details are painted on the glass after the traditional manner of painting such details in stained-glass windows. This painting is in brown or brownish black.

It is burned on in a kiln, and is done in a material that is lasting. Such painting is done either with iron oxide mingled with a glass flux or with vitreous "enamel," which is in the nature of an opaque colored glass that is pulverized, mixed with gum water for a vehicle, and painted on. Then it is fired, melting it down to form a kind of glass that unites with the glass upon which it has been applied. By reference to the close-up photograph (preceding page), it will be noted that the faces in these mosaics are drawn with a sensitive hand and that they have a fine spiritual quality. They remind one of the purity of line and form characteristic of the faces in paintings by the English master, Sir Edward Burne-Jones.

Opus sectile glass mosaic in the Baptistry, Church of the Heavenly Rest, of which the Chapel of the Beloved Disciple is a part. Mayers, Murray & Phillip, architects; craftsmanship by James Powell & Son

A variant of the technique employed in the mosaics of the reredos of the Chapel is seen in the mosaics in the Baptistry of the church. The methods are substantially the same, excepting that in the latter instance the mosaics are silhouetted and inserted flush with the face of the stone walls.

A photograph of the Baptistry is reproduced here, showing the mosaics in their surroundings, while a close-up photograph of a portion of the main figure shows the technique. In the latter photograph the difference in levels of the etched surfaces of the glass can be noted, and the interesting quality of the varied texture of the glass is well brought out. Much care has been taken, evidently, to secure glass of the proper surface character as well as the right color. It has the inequalities of the antique glass made by simple, even primitive, methods, to which the finest old stained-glass windows owe not a little of their vibrancy and rich tonality. A method is employed in representing the ground at the feet of the principal figure that does not seem to have been used elsewhere in these mosaics. Here, the glass is of a rich medium brown with golden undertones, and the deep brown that suggests the modelling is painted in vitreous color which appears to have had a thin, perfectly transparent, colorless glaze fired over it, preventing the painting from asserting itself as it might have done if its surface had stood out ever so little beyond the surface of the glass. It requires only the most minute difference in relief or texture sometimes to catch the light strongly. The glass used for this part is of a suitably uneven surface. The representation of the water, just below, presents with special clearness the etching through one layer of glass down to another, for the blue top is etched sharply down, exposing the silver glass back.

The effect of the mosaics in the Baptistry is very fine, for they tone in with the warm gray of the stone, while they furnish enlivening color. In the smaller inserts we see the Baptism of Jesus, the Israelites Crossing the Red Sea, and the Ark of Noah. The large figure, representing Christ, is particularly beautiful. The background is blue, with olive and brown tones in the ornament at the sides. The robes of the figure are mainly in translucent ruby over gold, elaborately etched. From a little distance this mosaic has the luster, play of varied color, and soft brilliancy of a fine old multicolor brocade, interwoven with threads of gold and silver.

BETTER PRACTICE

By W. F. Bartels

SHEET METAL

1—ROOFING

SHEET metal is generally thought of in the terms of roofing, yet today the uses of this material are legion. However, since sheet metal was employed first as roofing, this will be taken up first.

Galvanized iron is one material used for roofs wherein the finish is probably more important than the base. The base or iron sheet should be of a good quality, free from imperfections before it is galvanized. Many manufacturers now feel that the addition of copper in the base sheet adds considerably to its longevity. The galvanizing (generally about a pound to every ten square feet) should be protected from scratches or other abuses which might injure the surface and allow rust to obtain a start. Some objection has justly been held against galvanized surfaces in the past because it was a known fact that to keep paint on the surfaces was difficult. The manufacturers claim to have overcome this objection without harming the sheets, and are now offering galvanizing to which they claim paint will adhere permanently and securely.

The term "tin" roof is a misnomer. The plates comprising the roof are in reality not tin but steel. These plates are obtained in a variety of gauges and on them is put a coating—again not of tin, but one composed of lead and tin. The amount of this coating ranges all the way from a thin and almost negligible one to one that is fairly heavy and satisfactory. The use of steel in the plate is not to be construed as a substitute; it is necessary for strength.

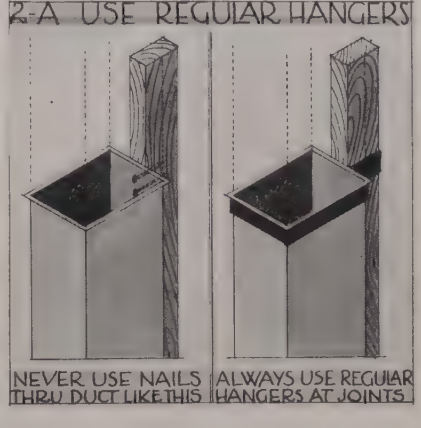
The architect should call for resin only to be used as a flux in connection with galvanized work. It will readily be appreciated by those familiar with chemistry that to use an acid where there is tin plating might easily eat away this soft metal and thereby expose the steel.

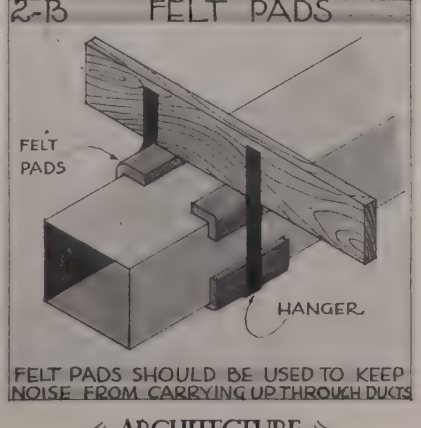
No storage of any materials should be allowed on a tin roof, because deep scratches would expose the steel to rusting. It is advisable to have the underside of the tin painted before it is laid and the paint given an opportunity to dry.

Lead is one of the oldest metals and is very satisfactory for most building operations. As a general rule it is not advisable to use it in direct contact with cement mortar. However, as copper is likely to stain any stone work of light color nearby, it is advisable to use copper that is lead-coated. Thus these two metals serve a very useful end when used in combination, as well as one which gives the architect more freedom in design. The lead on copper may be obtained in various weights and finishes. The gauge of the copper upon which the lead is coated should be specified.

2—VENT DUCTS

It behooves the architect before starting his specification for duct work to call specifically for the material he wishes used. It must be borne in mind that the ducts will not only have to be tight and rigid, but in the great majority of cases they will have to withstand that great foe of all rustable metal—moisture. Perhaps the architect will wish to use an iron containing copper in order that the ducts may better withstand exposure, but in any case it is wise to insist upon a known and tried brand.





Tinsmiths generally recommend 24-gauge material for ducts 12 inches in the wider dimension and under, while those between 12 and 48 inches should be of 22 gauge, and those over 48 inches should be of at least 20 gauge. The larger ducts should be braced with angle irons, properly hung and supported. These larger ducts, while needing more support by way of hangers, will of course not need to be supported horizontally as often as the smaller ducts. The latter should not be allowed to sag between the hangers and thus form pockets for the collection of condensed moisture. The architect should see to it that under no circumstances are the ducts nailed to anything to support them; instead they should be fastened by regular hangers (Fig. 2A).

Angles running under ducts to support them should be securely fastened to them so there will be no possibility of a rattle between hanger and duct. The duct, if it fastened against a solid part of the building, should be insulated with a pad of felt or other sound-deadening material, so that no noise will originate from this quarter (Fig. 2B). Duct work should be so laid out that it will not be necessary to run pipes through any portion of it. If this difficulty should be unavoidable, the intersecting pipes should be properly covered and, if a condition such as the necessity of running several pipes through a duct should occur, it might be well to enclose them with metal, so that the resistance they would otherwise offer to the flow of air is reduced (Fig. 2C).

Where a ventilating duct leads into a wall which is to be plastered, the architect should call for a frame

or brace to be placed in it until the plastering has been completed, otherwise the duct likely will become partly closed by the plasterer, who in order to keep his plaster tight against it may force the duct out of shape (Fig. 2D).

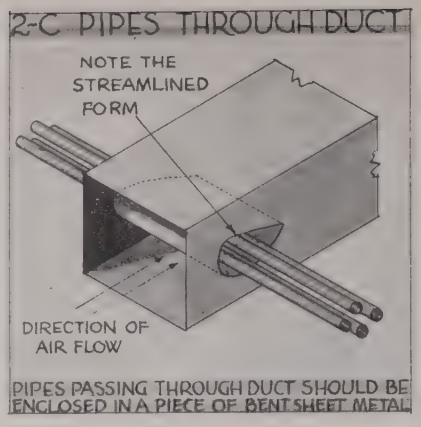
Where ducts are joined to fans they should be connected by means of tightly drawn canvas, so that there will be no possibility of vibration being set up because the motor is attached to the fan. The fan, too, should be set on an insulated base so that its vibration may be reduced (Fig. 2E).

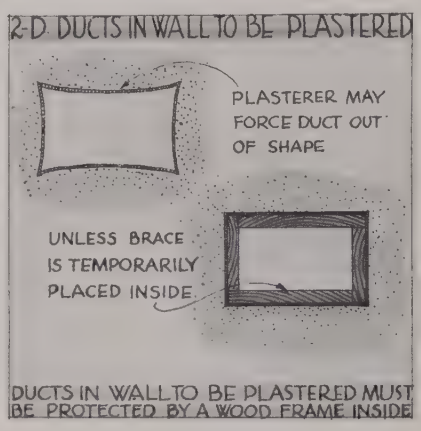
Grilles should be tightly fitted against the wall and securely fastened to the outlet of the duct so that no wall smudges will result (Fig. 2F). At the same time the architect should call for a fine mesh behind the grille so that small articles cannot be thrown in the duct or otherwise collect there (Fig. 2G).

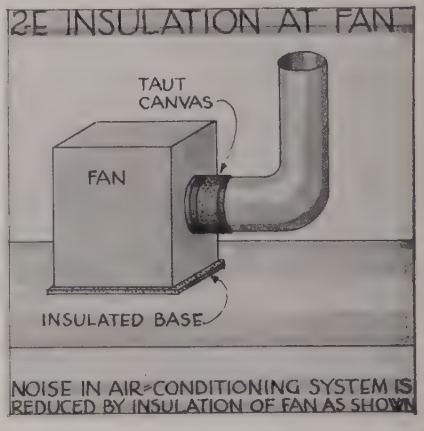
Where ducts pass through a roof, they should be properly flashed so that there will be no danger of water leakage around them. Should they extend any distance in the air above the roof they should be properly supported against strong winds.

The ducts themselves should be constructed in a workmanlike manner and in full accordance with all rules of good duct work. For instance, they should not be allowed to make sharp bends at right angles (Fig. 2H), nor should they take off from a main at a right angle (Fig. 2I). It should be kept in mind that round ducts offer the least resistance to the flow of air. Care should be taken to include all louvres that are necessary, and to provide all dampers and fuse links that may be necessary to comply with the law. In laying out the work it is advisable that access doors be provided close to fuse links, so that these may be renewed when necessary. It may be advisable in some cases to run the ducts so that a covering may easily be put around them, either to conserve heat or to keep it out. This covering, if done, should be studied carefully by the architect and a good job called for; all too often the mechanics are careless in the work of covering the vent ducts, much to the detriment of the job.

Very often, where ducts are to carry off the fumes of acids, the architect should have them lined with some such material as lead, so that the corrosion may be kept to a minimum; then again, a coat of acid-resisting paint may be considered sufficient. In either case it should be made certain that these linings are properly applied and fully cover the designated surfaces.







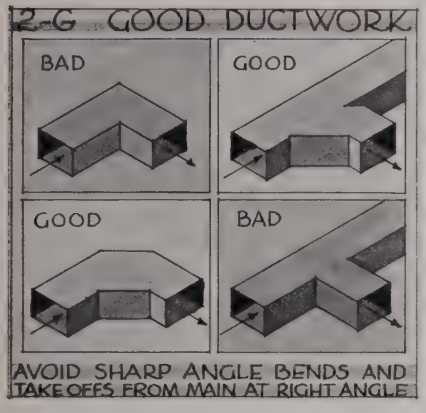
3—SMOKE STACKS—FIRE-RETARDING

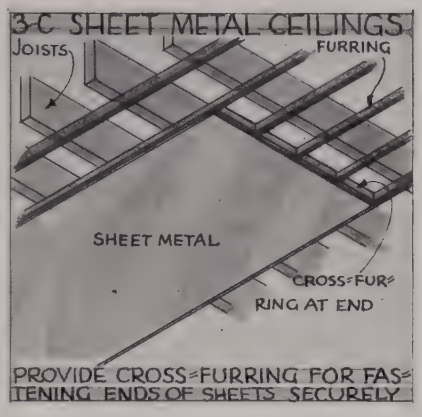
When smoke stacks and smoke breechings are a subject of the architect's specifications, he must be sure of the gauge of material going into them, and doubly sure of the kind of material he is getting. There are various grades of material entering into the makeup of this kind of work, and care must be taken in their selection. Galvanized iron would be of little use because of the action of acids and fumes upon it. It would seem that the best material would be wrought iron of such purity that it would withstand to a reasonable degree the hard usage to which it is subjected. Breechings should not be connected, where there are two or more heaters or boilers, so that any one of the boilers will get a better draft than the others. They must be so designed and laid out that there will be plenty of opportunity to have access doors so that each length or straight run may easily be cleaned (Fig. 3A). Where iron stacks are run on the outside of buildings, due to existing conditions, they should be properly supported by means of angles at a certain distance from the wall; this is generally governed by local building codes or fire ordinances (Fig. 3B).

Sheet metal is very useful as a fire retardant for boiler rooms and other similar spaces. When so used it should be at least 26 gauge. This metal is now allowable as one of the alternates in New York City for the fire retarding of public halls and ceilings in old-law tenement houses. In this connection it should be noted that it is not allowed to be used on the stair soffits.

Before being applied the metal should be backpainted to protect it against moisture or condensation. On the walls and ceilings it is generally used in the stamped form. It is not necessary to tear down the plaster before applying the material; in fact, there is some advantage in permitting the plaster to remain. Furring strips should be used, so that the surfaces may be true and level. This is particularly true in ceiling work where the building may have settled. All sheets should be

properly lapped and fastened. On ceiling work, cross-furring should be used for the ends of all sheets, so that they may be securely fastened (Fig 3C). All sheets should be properly caulked, but care must be taken not to dent the surface. An important item for the architect to consider in the use of this material is the nails. The nails must be of such size that they will hold the material firmly against its supports. It is understood that a longer nail must be used where the metal is used over plaster than when applied directly





to the furring. For cellar ceilings, the material is applied the same way except that the plain, unstamped variety is generally used.

4—GALVANIZED IRON

In laying out work of a temporary character, the architect should not overlook the possibilities of flat surfaces made with galvanized iron, or even the possibilities of open-air stands made with the corrugated variety of galvanized iron. Some of the latter structures have won favorable comment from both artistic and utilitarian standpoints. Also, there is the possibility of using corrugated sheets of iron in concrete forms, in order to give the surface of the concrete a rippled finish. Flat galvanized sheets can be very useful in enclosed radiation work.

Only the best grade of iron sheets should be used for galvanizing, because any imperfections in the sheets will cause corresponding imperfections in the galvanizing, and hence the sheets will soon be very likely to rust out. On siding, corrugated sheets should have a lap of at least one corrugation, while on roof work there should be a lap of at least two corrugations. Naturally, the corrugation should run in the direction of the slope. All corners should be properly enclosed by pieces made expressly for this purpose (Fig. 4A). In using fasteners for attaching galvanized sheets, care must be taken that no fasteners other than galvanized ones are used. Copper or iron fasteners used here would cause considerable damage by the electrolysis action they would set up between the various metals.

5—INTERIORS

The use of metal for both interior and exterior work has gained such a wide acceptance that the rate of increase has almost been too rapid for its own good, in that it has fostered the use of metals untried and unknown, sometimes resulting in failure or inferiority, bringing condemnation upon all uses of this material. However, sheet metal is particularly adaptable to the present vogue for flat surfaces. It can be used to great advantage on walls and ceilings of kitchens and bathrooms. In elevator cabs its appearance gives a feeling of stability, yet its weight adds scarcely anything to the weight of the car.

Probably all metals used on the exterior of buildings are adaptable to the interiors as well. Added to these might be those metals with an enamelled finish. While this finish is being used extensively for interiors, it is a little too early to pass judgment upon it as a suitably permanent material for exteriors. The enamelling of metal is a painstaking job, with a great disappointment awaiting the user if the job has not been done properly. It is absolutely necessary that the metal be properly treated before the enamel is applied. As this is largely shop work, the architect is forced to rely almost entirely upon the manufacturer and the fact that he is fully conversant with his business. Sheet steel is now used with a surface treatment which makes the finished product look like tile, marble, etc., not to mention a range of plain colors.

6—EXTERIORS

Sheet metal offers a number of advantages in the design and construction of new buildings or the renovation of old ones. Instead of doing an expensive masonry alteration to a façade, as was commonly done, the architect can now leave the old walls as they are and simply give them a new suit of armor, which if properly designed and applied, may appear very attractive.

One of the drawbacks in the use of metal for new fronts has been the terminology. Or at least this is so with the general public. Rust-resisting steel has been called by the general term "stainless steel" regardless of its composition. This is unfortunate in view of the fact that there are so many different kinds of this material, all having different proportions of steel, chromium, nickel, or other ingredients; each one being particularly suited for one particular purpose. Thus the architect should investigate and ascertain

which one best serves his purpose because of the specific properties which characterize it. The question of workability must be examined. Just as lead would not lend itself readily to delicate castings, so each material has its weak and strong points. Then too, the question of where the material can be fabricated must come in for consideration. Many of the old metal shops do not have the facilities for working this modern metal. And what may be even more important, they do not have the workmen capable of working it, and in the last analysis the quality of the work will depend largely upon the intelligence and experience of the men handling the metal.

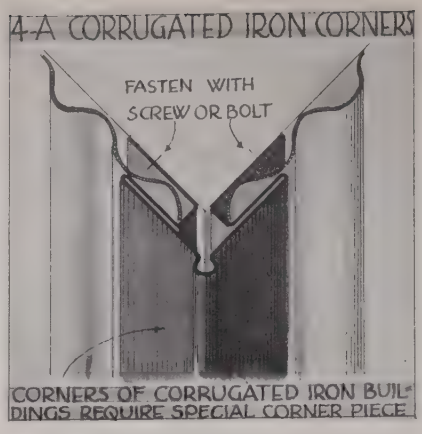
The possibilities of the metal have been gone into so many times that there is no need to dwell on this aspect of the material. As has been mentioned, sheet metal would materially reduce the weight of a building, with the consequent saving of steel compared with solid masonry. To those impatient for its general use, it should be borne in mind that building and fire regulatory bodies are not quick to adopt rules for new materials until the value of the latter has been proved. This is highly proper, but as time goes on we shall undoubtedly see the increased use of the lighter metals in building construction, and employed in such a manner that there will be no possible danger from fire and no undue amount of heat lost because of its ready radiation.

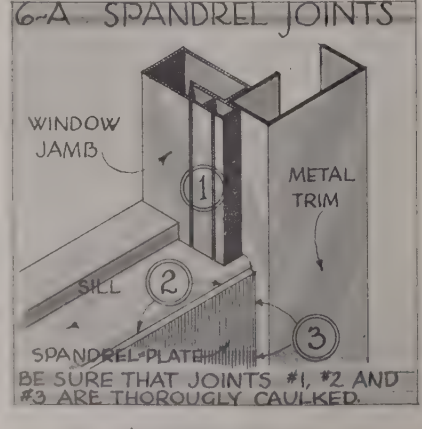
Before prescribing any new metal for his building, the architect should make certain that the metal has been tested under conditions similar to those it will meet on his building. Then, too, he must make sure that the material is properly fastened both to the adjoining sheets and to the building. If the metal is put in place by means of slip joints, care must be taken that water cannot be forced through by a strong wind or by capillary attraction. All vertical joints must be fully protected, both by the construction design and adequate caulking. Particularly is this true where metal touches metal, such as trim passing a spandrel plate (Fig. 6A). It must be remembered that the problem of expansion must be taken into account, and that different metals will have different coefficients of expansion.

The surface finish of the metal should if possible be one that is inherent in the metal itself. In the case of the various types of stainless steel, care must be taken to see that any welding or brazing is properly cleaned to prevent the incursions of rust. One of the chief causes of rust starting is not so much from any inherent fault in the material itself, as from the fact that it has been in contact with other steel or iron. Hence, after such work as welding has been done, it is well to call for it to have an acid bath as per the directions of the manufacturers. In the use of other metals besides steel, the architect must remember that patinas or surface coats will form on the metal after exposure to the weather, and if they do and are undesirable it will involve considerable expense to maintain or clean the erected surfaces. If nothing is done, the building may have an entirely different tone from that which was intended.

Aluminum offers many opportunities for the architect, both in design and workability. In sheets or castings it readily adapts itself to most designs, but is not readily welded or brazed. This probably will be overcome in the near future, and in the meantime by careful designing the architect can overcome the necessities for these fastenings.

The so-called "white metals" present certain problems for the architect if he is not observant. These metals are made of copper, silver, nickel, zinc and other non-ferrous metals, in varying proportions, each having its own characteristics. The metals are non-rusting, and the thought that must be given them concerns chiefly the finishes and effects they produce. They can be worked in most of the usual ways that metals can be handled, but are rather expensive for the ordinary type of building.





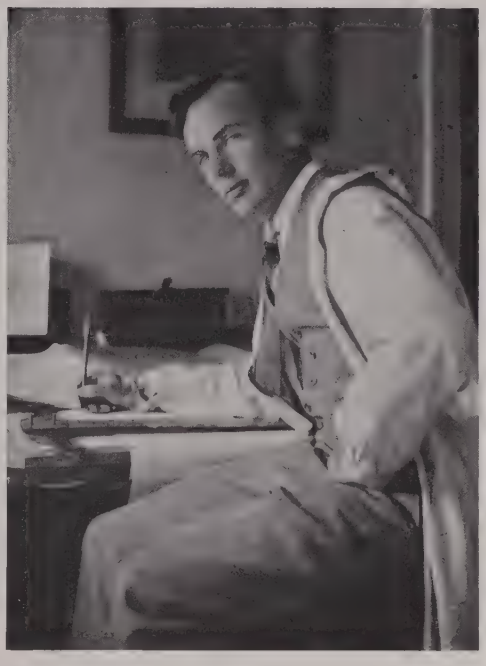
7—PAINTING

The painting of sheet metal is almost an art in itself. There are so many mistaken theories about this subject that it might not be amiss to go over some of these painting items as they affect various metals. It is a good general rule not to make the first coat of paint on metal a heavy one. In fact, this rule could be applied to practically all materials. Some people believe it necessary to allow zinc to rust before painting it. This is not so. With some galvanized iron sheets it may be necessary to use special paint or to clean the galvanizing before painting, but it is not necessary to defer painting. Aluminum paint sprayed on galvanized sheets gives a very attractive surface and one that will last a surprisingly long time. Many roofs, both old and new, are given coatings of coal-tar products to preserve them. While the roofer is doing this, he generously coats the skylights with the same material. This is very harmful to galvanized work and should be particularly guarded against. Either red lead, metallic brown, or red oxide of iron mixed with raw linseed oil and the proper amount of turpentine is satisfactory for the painting. Chromium steel, or any of the other metals compounded from non-ferrous metals, should never be coated with paint containing any metallic salts. Where these metals are erected while the buildings are in the course of construction, and not applied after all the heavy work is done, they should have a protective coat of some material which will be harmless to them and yet give them protection from the usual acids and salts that may be used on a building.

"I think architecture should be sold"

–David Ludlow, A.I.A.

If one steps into a group of architects and says, "What about professional ethics?" the group will divide in two equal parts, each of which will attempt to throw out the questioner—and for different reasons. To one group the words suggest a blue law; to the other, a holy of holies. What does the younger generation think about the subject—if anything? Here is one version—extracted only after the most relentless persuasion by the Editor. Perhaps some one else would like to rise and say a few words about how the profession of architecture should be practised.—EDITOR.



MIDWAY in the depression my tired and hurt feet and my even more sorely hurt ego told me that pounding the city pavements in search of another draughting job was futile. I had had two and a half years' experience in draughting-rooms since my graduation from college, and it looked as if that was about all I was going to have for some time to come. Having no other alternative, I retired to the suburbs. There I whiled away the time by making sketches of a small house for a friend who hoped to build some day. These first sketches were followed by others and, as I became more and more engrossed in this, a new field of architecture to me, there followed still more studies and plans of small houses of all types. In several months I had a sizable collection of houses on paper and was wondering how to make them come true.

I was now at the point where, had these been pre-depression days, I would have followed the precepts of my professors and, as a dignified "professional" man, would have "opened an office" and let my clients come to me. The time, however, was 1932.

I looked around at the architects who were waiting for clients to come to them, and saw them sketching nearby landscapes, or selling artists' materials in department stores. Forewarned by this, I decided that, at the risk of seeming like a doctor of the sort that puts a flaming neon sign outside his office window, I must make a business out of my profession if I were to practise it at all. I must sell my work and myself to the public.

The prospect was somewhat terrifying. The idea of being a "salesman" had always been abhorrent to me. I was not a salesman. Gathering my courage, however, I started my selling campaign by interviewing all the realtors in my own and adjoining towns. They seemed glad to let me put drawings in their windows, and after three months one small porch alteration job resulted.

But it became apparent that the drawings left in realtors' windows, while putting my name before the public, actually brought in few good leads. The real-estate people, like everybody else, were feeling the depression, and kept their best prospects to themselves, hoping to sell ready-built houses and thus collect commissions on land plus house. I soon saw that my "business" would fail unless some other selling methods were devised.

I finally faced the fact that, little as I liked the idea, I must go directly to prospective clients to sell my services, much as an insurance man sells a life policy. Taking the bull by the horns, I started by calling on my friends. Eve-

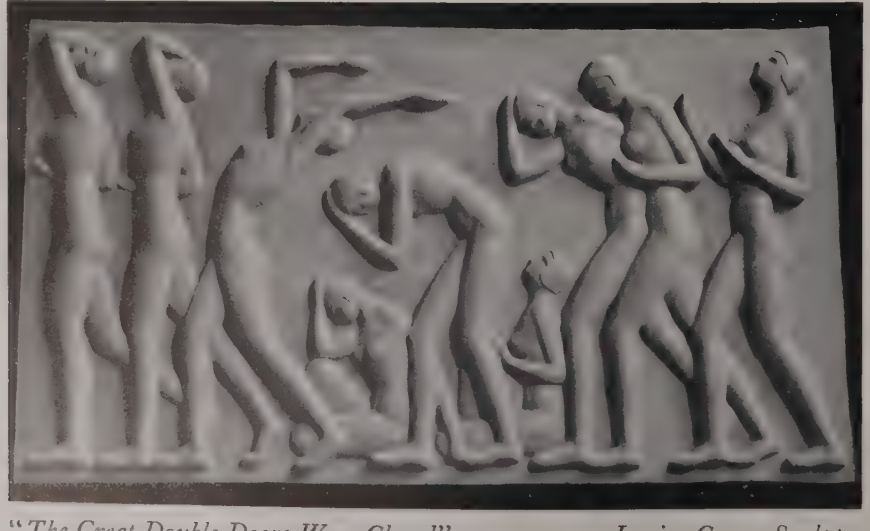
ning after evening I set forth with my portfolio of sketches under my arm until all my young married friends had been visited. All were glad to talk about building, but none had any immediate intention of so much as erecting a dog house. They suggested other people who as yet did not own their homes. I went to see these people, too, and they suggested still others. I ceaselessly called on all whose names I had gleaned, whether from friends, associates, or even, I admit, from chance overheard conversations. Each succeeding call seemed easier than the last, and it gave me self-confidence to discover that most couples wish to own their home some day, and, if nicely approached, are quite willing to discuss their ideas and needs. After each call, I noted down the financial situation of the prospects, in so far as I had been able to discover it; their preferences in home design; and the probable date of their becoming "hot" prospects.

After almost two years with nothing on my draughting-board but a little dust, two young couples decided simultaneously to build. I was chosen in preference to more experienced architects because six months previously I had practised my selling program on them by calling and showing interest in what were then only their indefinite future ideas about building. Other results of my past selling endeavor broke rapidly now. Inside of six months I had five houses under construction or on the draughting-board. This was at the height of the depression when, on all sides, my architect and builder friends were telling me that there was "no building going on anywhere."

Those first results of my selling methods came two years ago. Since then I have been increasingly busy. Large houses have taken the place of smaller ones on my draughting-boards, and I think that I can now say, thanks to selling, that my "business" is well established. I continue to safeguard it by being constantly on the watch for new prospects, and by keeping my name before old prospects in every possible way. I send them photostats of my new houses together with friendly letters explaining interesting features of the houses, and ways in which the owner has been benefited by architectural services. I follow up initial visits by telephone or personal calls at discreet intervals.

The attitude of my prospects toward being the victim of architectural salesmanship has been varied, but in general has demonstrated its success. There was, of course, the lady who barred me from her house after one glance at my portfolio, remarking that she did not want to buy any calendars, and there have been others who sent me away with a curt, "Not interested." But then, too, there have been the prospects who have kept me far into the night, wrapt in eager discussion of the house they are going to have some day. From these have come my actual clients. They are clients, however, only because of an extensive search for their names and intensive attempts at selling. Despite traditional opinions, it is my strong belief that selling has an almost indispensable place in the profession of architecture.

Some day, perhaps, I shall sit in my office chair and allow the office boy to usher in only the prospective clients who have jobs to offer me that are especially interesting or unusually remunerative. I wonder.



"The Great Double Doors Were Closed" — *Louise Cross, Sculptor*

Exterior walls, white-stained shingles; roof, brown-stained shingles; shutters, green

[IN THE SERIES OF ONE HUNDRED SMALL HOUSES]

House of James Burke
Summit, N. J.

DAVID LUDLOW
ARCHITECT

The first-floor bath is located so that it can be used by maid or as a guest lavatory. Garage entered without backing, and hidden from street—an infrequent combination on a narrow lot

If and when the garage is extended for two or three cars, longer axis of hall bath is changed so that hall leads to fourth bedroom. Master's suite has two dressing-rooms and five closets

Among the requirements for this house on a narrow lot were: porch, living-room, hall and dining-room must face south (toward the street); flat façade to be avoided if possible. As a solution the dining-room has been brought forward, leaving the main entrance doorway in a corner. Bending the entrance walk around a big tree gave opportunity to treat the corner entrance as indicated

The porch end—west. The house has a cubage of 32,700 feet, is insulated and weather-stripped. Air conditioning provides warm air, circulated, humidified, and cleaned in winter; circulated and cleaned in summer

Photograph by William M. Clarke

The problem involved the placing of the house in a group of oak trees in such a way as to utilize the shade of the trees in the garden

The east garden is framed by two projecting wings, of which this one is the study

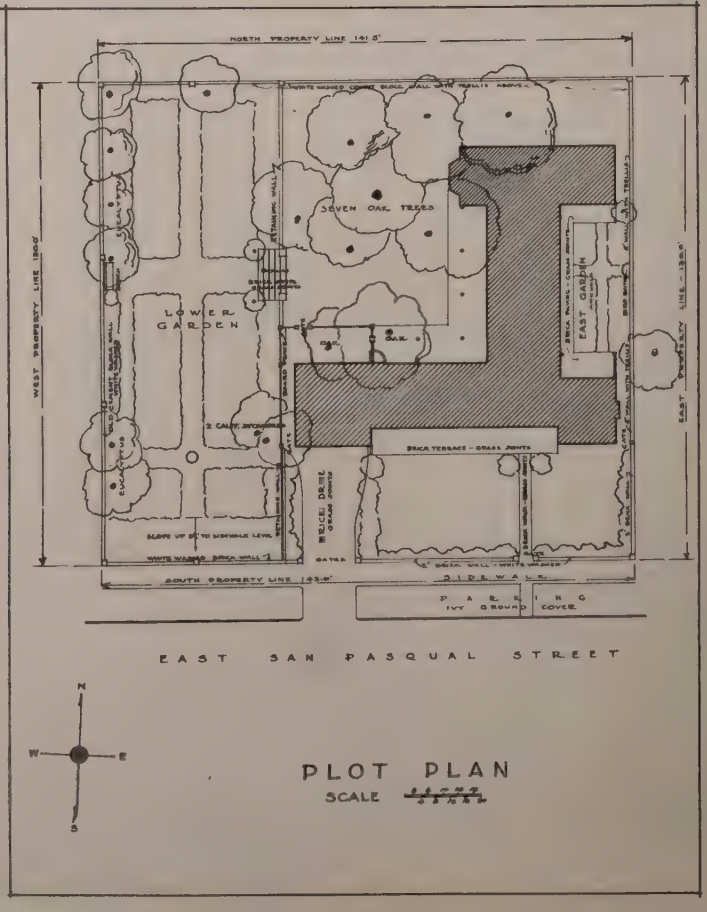
IN THE SERIES OF ONE HUNDRED SMALL HOUSES

House of Walter W. Fox Pasadena, Calif.

Ralph C. Flewelling
ARCHITECT

Photograph by George D. Haight

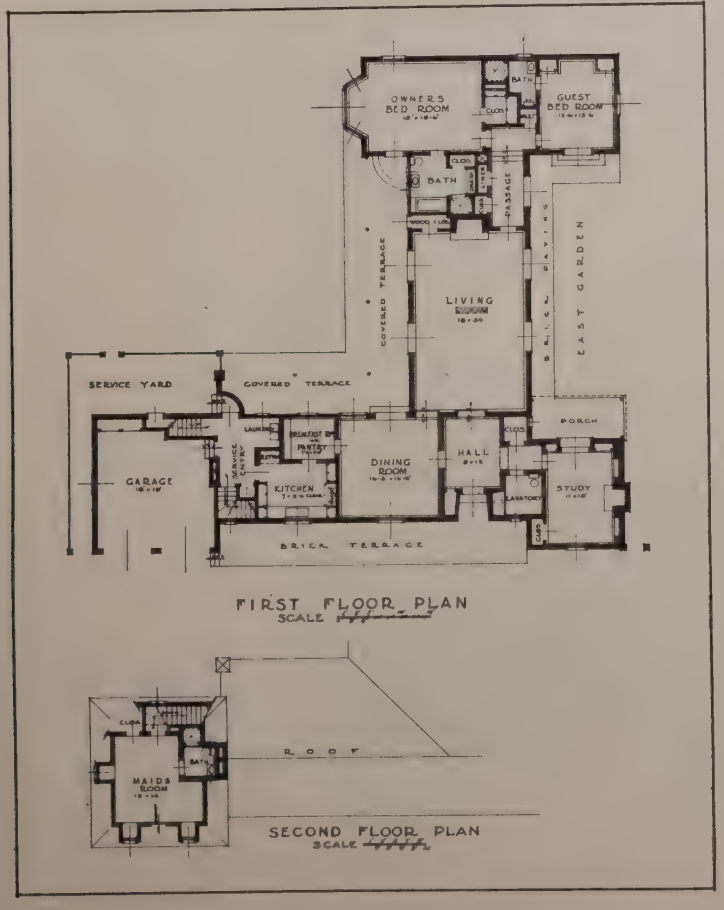
Looking into the corner of the house sheltered by the right-angled covered terrace. In the foreground is the bay of the owner's bedroom



The plot plan indicates how the architect has utilized the full area of his plot, while making the most of the seven oak trees, and keeping his approach to the garage very short

Photograph by George D. Haight

House walls are of brick, painted white except under the covered porches, where pine boarding and vertical battens are used. The roof is of slate in colors ranging from green to dark purple



As in many California country houses, the bedrooms are on the main floor with the living quarters. Only above the garage is there any use of the second floor. Structural glass was used for wainscoting in bathrooms; rubber tile for sink drain boards in the kitchen, ceramic tile for shower enclosures

Photographs by George D. Haight

Fireplace end of the living-room. Ceilings throughout are of wood with a very narrow V-joint. Hardwood floors are used except in the bedrooms where they are of wide pine planking, painted

The bay end of the owner's bedroom, in which the windows are steel casements

Friday, November 1—Joined a group from the New Housing Committee in visiting the Boulevard Gardens Apartments over in Woodside, Long Island. This is one of the first limited-dividend projects to be completed under the New York State Housing Law with PWA financing. The plot of eleven acres cost, I believe, about a dollar and a quarter per square foot. The coverage is only 23 per cent, of six-story self-service elevator apartments, having from two to five and a half rooms. The room cost per month averages eleven dollars.

The project is an attractive one, particularly in the size and openness of the courts. T. H. Engelhardt designed it, using common brick for the walls with some limestone trim—rather more elaborately treated in this regard than Clarence Stein's Hillside project, where brick alone was used. One or two interesting figures that I gathered were these: There are 2.65 persons to an apartment; 18 per cent of the population consists of children under eighteen years of age; there are about ninety-five apartments to a building, and each building has its own oil-burning plant for heating and hot water.

Saturday, November 2.—Dean Hudnut, now head of the Harvard Architectural Department, sounds another one of his occasional blasts against traditional architectural education. "Ingenious conceits imported from Paris are largely responsible for the divorce between designing and building which is devitalizing architecture"—from which, with other pointed remarks, one would gather that Dean Hudnut does not approve of the Beaux-Arts system. Yet I can well imagine that the most enthusiastic advocate of the Ecole would not quarrel with the dean's definition of our present need: "a common process integrating the creation of practical buildings with the discovery of beauty." Is the line then, to be drawn only between the methods of achieving this end? With his definition of the end itself, there could scarcely be any vital disagreement.

Sunday, November 3.—"America's Little House," which Roger Bullard and Clifford Wendehack designed for the Better Homes in America organization, and which for a year, in its modest frame construction, has stood between tall, haughty apartment houses on Park Avenue, goes to the wreckers tomorrow. Approximately 166,000 visitors have inspected it. Some of us had feared that since blueprints of the plans were available for sale, it might be spawned rather freely all over the United States. However, I believe that only sixteen sets were sold.

Monday, November 4.—Another triple election to the Hall of Fame leaves as yet unrepresented therein the architectural profession. I was hoping that Charles Bulfinch would find acceptance among the distinguished electors this time, but apparently his name was not so favorably considered this year as it was some years ago. Instead, Charles F. McKim appears well up in the list of architects, with forty-four votes—the three men elected, William Penn, Simon Newcomb, and Grover Cleveland, received respectively eighty-three, seventy-eight, and seventy-seven votes. Frederick Law Olmsted registered thirteen, as did Charles Bulfinch, and Henry Hobson Richardson, seven.

The Editor's Diary

Wednesday, November 6.—Values of realty bonds in recent years have been at a point so low that it was discouraging even to mention them. However, the index figures which represent the sum bid for one thousand dollars of face value—based on two hundred eastern issues in many cities, rose from $187 to $220 during 1933, to $294 by the end of 1934, and in the first ten months of 1935 to $376.

Thursday, November 7.—Ellis F. Lawrence in from Portland, Ore., filled with concern over the architectural educational problem. I for one should hate to be studying architecture as an undergraduate student at the moment, for I would most assuredly have many doubts as to whether I would emerge properly equipped to cope with the architectural practice of tomorrow. In the earlier years of this century Lawrence and I, at Massachusetts Tech, may have wasted a great deal of time in learning details of the orders and schools of ornament, but at least we were constantly steeped in an atmosphere of beauty and architectural creations that have endured through the changing tastes of many ages. I am by no means convinced that a better system of architectural education has been devised.

Saturday, November 9.—When one looks over the total figures representing PWA's slum clearance and low-cost housing efforts, the picture is not so discouraging as our vast hopes and continued disappointments have led us to expect. The total includes thirty-seven projects with allotments amounting to $98,843,000, plus a reserve of $1,350,000, and this work includes that which will be under construction prior to January 1, 1936. These projects, in addition to the seven housing projects with allotments of $18,054,000 financed from the original PWA fund, will constitute the PWA Housing Division's complete program under the President's recent ruling. All other projects not in condition to go ahead before September 30, last, are suspended.

Tuesday, November 12.—Talbot Faulkner Hamlin, who is librarian of the Avery Library at Columbia, says that his readers these days seem older and more mature than those of a few years ago. Aside from the minor factor of economic conditions, Mr. Hamlin thinks that there is a great deal more advanced research being done than ever before. In spite of the fact, therefore, that the cry today is usually for the new, the experimental, the individually creative thing, there are more people than ever before who are searching the records of the past.

Wednesday, November 13.—Dr. Harold G. Moulton, head of the Brookings Institution in Washington, told a number of editors in the technical press at luncheon today of his extensive efforts to find out how America's ability to produce goods compares with our ability to acquire and consume them. Apparently there is a slack of twenty points in a hundred—our normal production being eighty, and our ability to produce, one hundred. Even in the best times we do not make all that we can use, and of course the reason is that the great mass of the people cannot buy any larger proportion of what they would like to have. It brings us around to the old question of how to secure a more equable distribution of income.

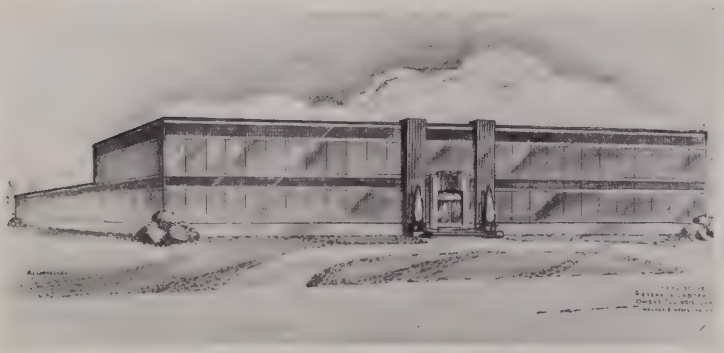
Thursday, November 14.—The Architectural League was crowded to the limits of its capacity today when George McAneny was the guest of honor, to tell us something about the New York fair of 1939. Every architect in New York who thought he might get a job designing it was on hand. Mr. McAneny, however, felt very deeply that the problem in its early stages was one of finance, rather than of design, and that shortly, when the proper time comes, all of the architectural advice that was available would be welcome—which I should say, was opening the door to a Niagara.

It appears that in three months, however, the New York fair has progressed to a stage reached by the Chicago, 1933, fair organization only after a year and a half of argument and work. Whereas it was apparently difficult to arouse the people of Chicago to an enthusiastic acceptance of the idea, the people of New York arose and cheered as a unit when the idea was first broached.

(*Continued on page 40*)

The first section of the Jane Addams housing project in Chicago—a PWA effort to provide 982 dwelling units. Architects: John A. Holabird, John A. Armstrong, Elmer C. Jensen, Philip B. Maher, Ernest A. Grunsfeld, Jr., Melville C. Chatten, John O. Merrill, Chester H. Walcott, Ralph D. Huszagh, Frederick Hodgdon

The Campanile of Pisa, continuing its inclination, is about to be shored up by forcing cement at high pressure into the foundations



The proposed laboratory for Owens-Illinois Glass Company at Toledo, to be built entirely of glass blocks, without windows. Walker & Weeks, architects

ARCHITECTURA

Proposed combination of administration building and shelter for the Anti-Cruelty Society of Chicago, on West Grand Avenue. Leon E. Stanhope, architect; perspective by Allen M. Weary

The proposed gold bullion depository for the government at Fort Knox, Ky. It will eventually be a strong army post. Supervising Architect's Office; perspective by J. M. Lowe

Riverdale-on-the-Hudson is to have this multi-family project costing $1,250,000. Stonehurst Apartments will contain 304 apartments, most of them with a view over the river. Harry P. Jaenike, architect

© Fox Photos

London's new British Broadcasting Building. Lt. Col. G. Val Myer, architect, associated with M. T. Tudsbery, civil engineer

Venice, with all its gondolas, now has this garage at the end of the Auto Bridge. Here motor transportation ends as one enters the city of canals

EWS

HOTOGRAPHS

In the group of buildings located in southwest Washington, near the Lincoln Memorial, is this new home of the American Institute of Pharmacy. Office of John Russell Pope, architect

Once more the Pulitzer Memorial Fountain in the Plaza at 59th Street and Fifth Avenue, New York City, is presentable after the rebuilding of disintegrated masonry. Dan Everett Waid was the architect in charge of the restoration

(*Continued from page 37*)

Saturday, November 16.—When one's knowledge of the design of a building is limited to what may be seen in the finished result, there is hidden away, in the processes of evolution, a vast amount of study between widely different solutions, a gradual refinement of detail—all of which is usually lost to the world. This fact was brought home to me strongly this morning in going over with Cass Gilbert, Jr., the preliminary drawings for the home of the Supreme Court in Washington. The vast sheath of tracing-paper studies bears evidence of the fact that Cass Gilbert was satisfied with no solution of even a detail until every other reasonable possibility had been explored and abandoned for good cause. It was with something of a shock that I came upon a study in which the plan was a cross, supporting a flat dome. One could not well imagine a solution differing more widely from the final one.

Monday, November 18.—There is a well-founded impression that Egerton Swartwout is the outstanding example of an architect who practices his profession as an individual rather than as a part of an organization. He likes to use a pencil himself, he likes to make charcoal full-sizes, he likes to get his hands in the modelling clay and determine subtleties of form for himself. All that being the case, one would rather expect to find him isolated from the world in an ivory tower, knowing little of what the world outside is doing, and caring less. Nevertheless, in lunching with him today, I was impressed, as many times before, with the fact that he seems to know more about the personalities and the activities in the architectural profession than any other single individual with whom I have come in contact. In spite of his individualistic practice, his membership on the National Fine Arts Commission has the effect of setting him upon a high hill, commanding a broader view than most of us can acquire.

Wednesday, November 20.—Dropped in at Arthur Crisp's studio to see two murals that are just about to leave his hands for their final destinations. One is "Four and Twenty Blackbirds," which should give to the bar patrons of the Hotel Carter, in Cleveland, something of the same enjoyment that was to be had many years ago from Maxfield Parrish's "Old King Cole" room in the Knickerbocker Hotel, New York. Vincent Astor bought this latter mural when the hotel was torn down, and, after a sojourn in the Racquet Club, it has found its way to the new bar of the Hotel St. Regis. Another more extensive work of Crisp's, not entirely finished, are the murals for the Psychopathic Hospital, New York City, designed by Thompson, Holmes & Converse. Crisp has taken the subject of "Aladdin and His Lamp" and treated it in a particularly decorative and whimsical manner that differs so widely from the technique of his "Four and Twenty Blackbirds" as to make one wonder that the two were produced by the same painter.

Friday, November 22.—Hobart Upjohn launched his 1936 project for the New York Chapter today at luncheon, with a talk by Ralph Walker regarding the absurdity of Manhattan's zoning laws, another talk by Arthur Holden on his favorite theme of putting a lot of real-estate owners into one bag so that they will agree upon the development of their combined holdings, and finally a word from Horace Kallen of the Park Department, who convinced most of us, I think, that the building of a civic consciousness and a desire for better cities has got to be made as much a matter of the individual's choice and habits as brushing the teeth, for instance. From kindergarten up, children, youth, and mature citizens must be so inculcated with the desire for better cities that these will become a natural possession. All the work of our civic groups, housing conferences, open-space associations, and the like are but feeble efforts toward such a magnificent objective.

Saturday, November 23.—The American Society of Landscape Architects has evidently got a vigilance committee on the job. They object systematically and frequently when magazine editors publish photographs without credit to the landscape architect involved. The editors, I am afraid, are usually innocent in this matter, having received the illustrations from an architect who had failed to mention his landscape collaborator. With all the fuss that the architectural profession has made over the failure of magazine and newspaper editors to credit illustrations to the architects, it would seem to be rather inconsistent for him to commit so frequently this error of omission.

Monday, November 25.—Lunched with A. Warren Canney today, developing the theme that the architect has really got to start thinking about air conditioning when he is designing his foundations. The day is not far distant when it will be as much of an absurdity to consider air conditioning as an accessory, to be put in when the building is nearly completed, as it was for the French architect of a very recent day to build his monolithic concrete building and then begin to think about his plumbing and wiring and where it should go. In a word, air conditioning, to be a satisfactory and economical job, must start with the exterior wall structure and its necessary openings.

Tuesday, November 26.—Otto Teegen tells me that he has just succeeded Ely Jacques Kahn as Director of Architecture in the Beaux-Arts Institute of Design. He surely has ahead of him a tremendous job, what with the whirling chaos that architectural education at present resembles, the residue of sentimentalism in the Beaux-Arts system, and the existence of an institution that was started with the most altruistic motives and a boundless enthusiasm, and which has behind it a record of achievement of which any educational institution might well be proud. Teegen has an open mind, the vigor of youth, and the urge to further the cause of architectural education—a rather good equipment for his job. Ely Jacques Kahn becomes Chairman of the Board of Trustees, where his experience and judgment will still be readily available. Teegen, it will be recalled, and Irvin L. Scott were associated with the late Joseph Urban, and since his death have carried on their own architectural practice in the same offices.

Wednesday, November 27.—It is curious how in recent years the significance of the word "standardization" has changed in the architect's mind. It was not so very long ago that the sound of the word inevitably caused the architect to turn up his nose and assume that haughty demeanor which indicated more clearly than words that anything of the kind was beneath his notice and in violation of all his æsthetic principles. Today standardization has no such meaning for the profession. The architect realizes that it is only through the accurate standardization of parts that he can build economically and satisfactorily—imagine what a lack of standardization would mean to the builder of automobiles. Standardization has marched into the architect's office in the form of radiators, windows of wood and steel, doors, wall units of brick, terra-cotta, and other materials, plumbing fixtures, hardware, electric equipment, and as the architect becomes better acquainted with it, he finds it a friend instead of a foe.

Saturday, November 30.—H. F. Richardson, the consulting engineer, says that almost anything can happen in electrical invention and development in the next twenty years. The moral is to put adequate wiring into new buildings when they are built, to allow for future additions. Just as an example of what we are likely to have, the engineers have developed a new burglar alarm, making use of the so-called electric eye, by means of which a property is guarded not in the wall, but outside the wall. The crossing of a beam of invisible light which, by mirrors, extends around the building, may be made to touch off various things: dialing the police department on the telephone, to repeat a prearranged message; dialing any other telephone number, as for instance a neighbor's house where the owner may be playing bridge, and telling him also that burglars are about.

NEW HOUSEBUILDING TECHNIQUES

Introduced by the technical survey made and reported by the FHA, which was printed in ARCHITECTURE'S *November and December issues, we purpose reviewing in detail these new methods and materials. Invention and quantity production are storming the citadel of dwelling construction, a citadel unmarked by radical change in many generations. Tomorrow the small house may be quite different from those of our fathers and grandfathers. Already it is different in its equipment and accessories; changes in the structure itself may be imminent. Throughout America hundreds of inventors are pressing forward toward this goal, each one confident, probably, that he holds the key to next year's universal method of building the dwelling. A snap judgment among them is impossible. There are many hurdles on the course, all of which must be cleared by the winner: durability, low cost, ease of erection, weather-tightness, ready adaptation to the slow but sure progress of the public in architectural taste, wide geographical distribution without undue cost on account of weight or isolation of raw materials—to mention some of the higher hurdles. For the present, all we can do is to present the new systems. Their ultimate acceptance or rejection will depend largely upon your faith in their merits and your willingness to submit them to the test of use—"the proof of the pudding . . ."*—EDITOR.

The Reynolds System

BY RAYMOND T. B. HAND

Greater acceptance and use of fire-safe materials, air conditioning, and modern insulation methods have had far-reaching effects on the procedure of building. Today's materials are not efficiently handled in traditional ways. With each step forward in the development of the modern house, the process of building becomes more complicated. Not only does the introduction of air conditioning and proper insulation require additional technical knowledge—it automatically increases the number of materials entering into the construction of the house. This increase in *parts*, alone, makes the factor of sources an important consideration.

The Reynolds Corporation has developed a house which is a move in the direction of simplification of the building problem. The plan is founded on two basic ideas: (1) an attempt to offer those engaged in building, the best in construction and equipment that modern engineering can produce; and (2) to reduce numerous sources of materials to one. At the same time the Reynolds Corporation adheres to the policy that no infringement shall be made upon the realm of architect, builder, or dealer. The plan does eliminate drawing up of specifications in outside shops. The company feels that in order to get the maximum unification and co-ordination in the integral parts of the house, all plumbing, heating, air conditioning, wiring, etc., should be planned and supervised by a single staff of technical experts.

The Reynolds house is in no sense the prefabricated house—it is custom built. The process of construction is, however, standardized so far as possible. The architect draws his plans just as in the case of any other house. These plans are then submitted to the Reynolds Corporation. Here the plans are gone over by Reynolds engineers, who in turn draw up specifications for the company's plants. Parts are then developed, or fabricated; each individual piece is numbered for position; a corresponding identification appearing on working plans sent to the building contractor.

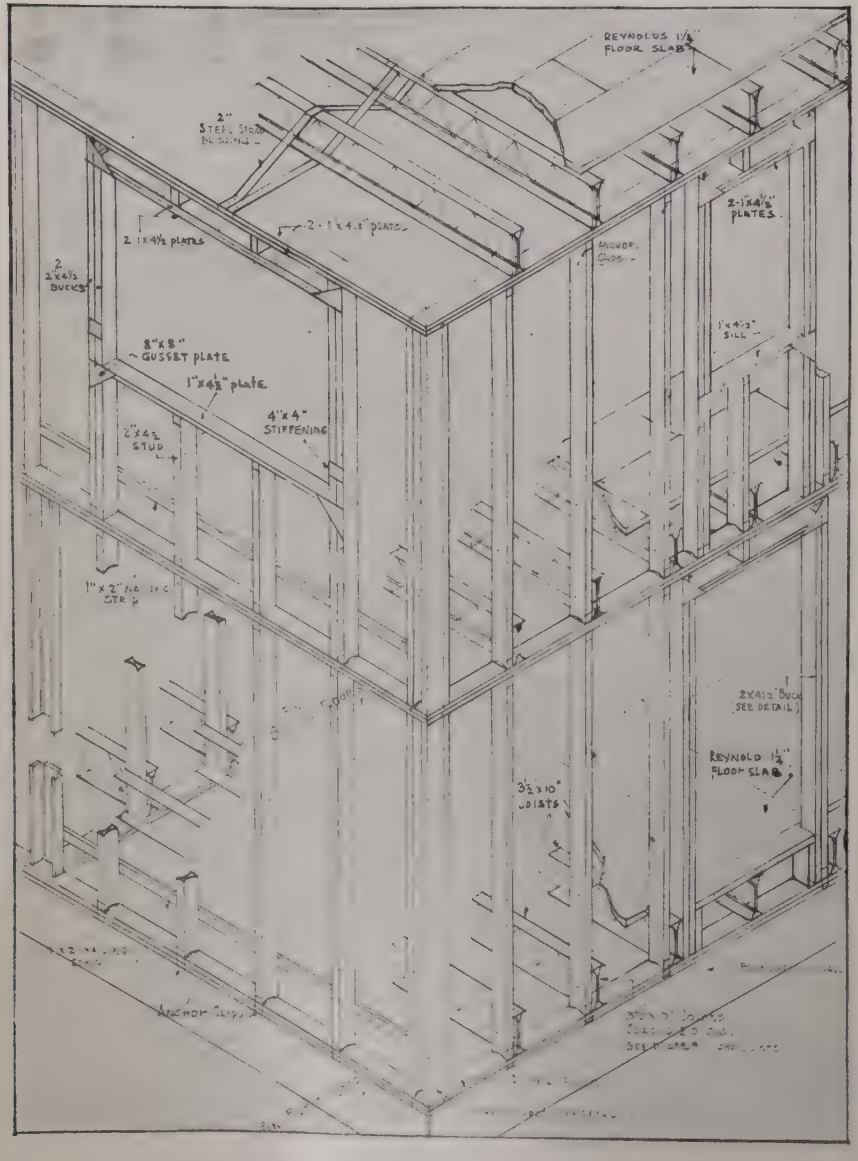
The Reynolds Corporation is an outgrowth of the Reynolds Metals Company, founded in 1912. At this time the company was primarily engaged in the manufacture of foil for package wrapping. The first indication that foil was valuable as an insulator was obtained from Germany. It is interesting to note that its first important use in building was exploited by the shipbuilding industry—an industry where there is a premium on lightness and fire-resisting properties.

The idea, as it now is developed, is more than an attempt to supply a number of individual materials which enter into the building of a house. The basic materials are sold as a unit in a properly specified and co-ordinated house. In the final analysis, the idea includes supervision of the handling of the materials fabricated. The corporation takes care of everything that goes into the integral parts of the house, *i.e.*, complete framing, plumbing, plumbing fixtures, structural flooring, heating, and air conditioning. There is no restriction on the choice of any finish materials, such as hardware, lighting fixtures, finish flooring and wall coverings. While the company manufactures steel windows, the architect may specify any type or make of window desired. However, specific mention of the type to be used must be made at the time plans are submitted to the Reynolds engineers. The reasons are obvious. Individual types require varying clearances in framing. As is customary, the architect specifies the general type and quality of materials desired by himself and his client.

During construction of the house, Reynolds engineers check the progress of the house, not replacing the legitimate supervisory work of the architect or general contractor, but simply supplementing their activities. The company builds no houses itself. The builder operates as he always has in the past. Once specifications are agreed upon, the builder, if he has not already done so, selects the dealer who is to handle the materials for him, and through whom Reynolds distributes its products. All materials, whether sold directly through the dealer or whether sold

In this stage of construction the building, at a superficial glance, might be mistaken for a traditional wood-frame structure

An isometric drawing of the structural assembly. Studs are of thin sheet steel, concave at sides and filled with a fireproof material



by Reynolds direct to the builder or the architect, are distributed through the dealer. He is the best judge of local conditions and credit. He is also equipped to perform an indispensable warehouse and delivery service.

The Reynolds Fiscal Corporation supplements local financing. It in no sense competes with established mortgagees; but is prepared to perform two functions. It acts in an advisory capacity to owner or builder in obtaining the most satisfactory local financing. It is prepared to make direct loans, both construction and permanent, to owners and builders, *only* when local facilities are not adequate. This Fiscal Corporation is co-operating with the Federal Housing Administration, making loans which meet the requirements of the FHA's mutual mortgage insurance program.

The Reynolds idea is an adaptation of certain features which have been so successful in the automotive industry. As the modern house becomes more of a mechanism, the greater the difficulties and intricacies that arise in the assembling of materials and equipment. No sane person today would attempt to assemble an engine of parts manufactured all over the country. Even were this conceivably possible, the difficulty of fitting such parts with the precision required would neither be economical nor practical.

In application, the Reynolds system of framing is similar to ordinary wood framing, except that all the members are flameproof, and all are of greater strength and rigidity. Because of the strength of the members, the structural design is created to take advantage of this quality in the economic spacing of members.

The floor joists, designed and tested by engineers to assure sufficient strength for all loads to which they will be subjected, are built up of steel cover plates, wide flanges, and web centers. Flange and cover plates are crimped and filled with a fireproof filling mixture to make top and bottom core. These cores constitute the nailing members, and are handled in the same way as in timber construction.

Floor slabs are of a specially prepared compound, 1⅜" thick, 15½" wide and 4' long. Slabs are reinforced with Reynolds Ecod Fabric and additional stud bars. They are sufficiently light to permit one man to carry two slabs on the job.

The structural members are prefabricated to finish size, but may be cut with a hack-saw

The carpenter nails together a door or window buck just as he is accustomed to do in wood construction

Studs are toe-nailed to sill, and because of their metal sheathing they cannot split as wood studs frequently do

Studs are of the same general composition as the joists, rolled from sheet steel, and measuring 1¾″ in width and 4½″ in depth, and filled with the same mixture, so that they become nailing members. All but the window, door and cornice studs, which have one flat side, are concave in shape, measuring about ⅝″ in the center. Members cannot buckle out because of the form, and cannot buckle in because of the filler. At window and door openings, and where there are special loads to be borne, bucks are doubled or tripled and bound by braces. Lintels are secured to bucks by sheet-metal gussets. Special reinforcing is done where loads or spans demand. Interior partition studs are of the same general character as exterior studs, except that they are either 2″ or 4½″ deep, depending upon the conditions.

After the foundations have been completed, the framing goes up in the same manner, fundamentally, as wood framing. Sills are laid directly on the foundation to conform to whatever exterior finish that is to be used—brick veneer, stucco, etc.

Floor joists are placed on the sills, two feet on centers, bridged every eight feet with a steel band 2″ wide. The longest span is eighteen feet. The floor slabs are laid directly on the joists with the four-foot shiplap dimension at right angles to the joists. The outside framing consists of a series of standard studs and window bucks placed on 16″ or 24″ centers. When the first floor is finished, the second-floor framing is completed, followed by wall framing for the second floor.

Roof structure consists of 4½″ roofing members used for rafters, placed on 16″ centers, with 2 by 4 members for bracing.

Interior partitions are framed with regular Reynolds studs placed 16″ or 24″ on centers, secured by a shoe on the floor and a plate of the same dimension at the top. When the main chassis is completed, partitions are set for the division of space, installing the necessary materials required for the application of the fabric plaster base, ducts, etc. When air-conditioning ducts are to be run through the partitions, plates are cut out to admit passage of the ducts, and tied together with structural angles nailed at the side in the usual manner. Plumbing is installed in the same manner as in wood construction.

Spacing the floor joists, in the top and bottom crimped web of which is a fireproof core to receive nailing

Once spaced the floor joists are bridged with pairs of 2″ steel strips nailed to top and bottom cores

A steel window in its buck. Note that this is secured to studs and plate by 22-gauge gussets

In an open stair well short pieces of studding, with outer side flat, are inserted in the joists for nailing

Plumbing pipes and BX cable are easily run through the diagonal web members of the floor joists

Electric wiring is of the normal cable or conduit type strung between the diagonal webs of the joists, and in the walls holes are punched through the center of the studs to admit passage. Air-conditioning ducts are concealed in the walls and partitions.

When all mechanical equipment is installed, the Reynolds Ecod plaster base is applied. Ecod lath comes in sheets 48¾″ long by 31″ wide. The lath is built up of V-stiffened steel ribs 4″ apart, electrically welded to cross wires at right angles, woven through waterproof paper, with or without metal backing. It is applied so that the ribs on the side walls run horizontally, by nailing through the rib at every cross member. When metallated fabric is used, the bright metal faces the air space. When other types of insulation are used, they are installed separately in the wall construction.

The outside wall finish depends upon the desires of architect or owner. If brick veneer is used, Ecod lath is applied directly to the frame, and the veneer is laid up one inch from the Ecod Fabric and slushed in solidly with mortar. If a stucco finish is used, no sheathing is applied. Where wood siding or shingles are desired, sheathing is nailed directly to the metal studs, and shingles or siding are applied in the usual manner.

The Reynolds air-conditioning system is unique in that it is a completely fabricated unit from burner to grilles. All mechanism for year-round air conditioning is under one cover—except the compressor, a compact unit in itself. This is located apart from the conditioner and is connected by a small copper tube.

The air ducts, fabricated in the factory, are made in a great variety of standard straight runs, turns and reduction units. These are assembled with special snap locks—a patent device which eliminates the need of solder or sheet-metal screws, materially reducing installation costs. The depth of these conduits has been standardized at 8″—primarily to assure sufficient head-room in the cellar.

The heat exchanger is an ingenious variation of the extended surface type. It is built in sections to permit the most efficient size for different types of houses. Cast-iron fins are designed and arranged in such a fashion that a maximum heating surface is exposed for a given size of chamber. Since the size of the unit is determined by the number of sections used, the maintenance of the same efficiency in different-sized units is obtained. The principle is, that with each added section there is a correlated increased combustion-chamber capacity, increased heating surface, and increased air-passage capacity. The ratio of air supplied is therefore directly proportional to the fuel burned. Either oil or gas heating may be specified.

The circulation fans are large and operate at slow speed, a fact which makes for quiet operation. The scheme also provides a reserve air capacity should conditions demand it. Both motor and fan are mounted on resilient bases to preclude any vibration being transmitted to the system. The oil burner, if used, is of the pressure-atomizing type.

The grilles have been designed in accordance with known air-flow principles—in order that free and uninterrupted delivery of air may be possible. They are styled to become integral, unobtrusive parts of the decorative scheme.

Reynolds plumbing fixtures conform to the latest concepts of modern decoration; whether in enamel or in china, they may be obtained in a large variety of design and color. Typical is the patented shower control, which not only keeps the shower at the desired constant temperature, but automatically prevents scalding—the maximum temperature is controlled at 110° F.

Ship-lap floor slabs, 15½″ by 4′, reinforced by Ecod fabric and stud bars, are light enough for easy handling

A close-up view of floor slabs on the webbed joists. On this is laid whatever finish flooring is specified

NUMBER 111 IN A SERIES OF COLLECTIONS OF PHOTOGRAPHS ILLUSTRATING VARIOUS MINOR ARCHITECTURAL DETAILS

ARCHITECTURE'S PORTFOLIO OF FIREPLACES

(MEDITERRANEAN TYPES)

Subjects of previous portfolios are listed below at left and right of page

1926
- DORMER WINDOWS
- SHUTTERS AND BLINDS

1927
- ENGLISH PANELLING
- GEORGIAN STAIRWAYS
- STONE MASONRY TEXTURES
- ENGLISH CHIMNEYS
- FANLIGHTS AND OVERDOORS
- TEXTURES OF BRICKWORK
- IRON RAILINGS
- DOOR HARDWARE
- PALLADIAN MOTIVES
- GABLE ENDS
- COLONIAL TOP-RAILINGS
- CIRCULAR AND OVAL WINDOWS

1928
- BUILT-IN BOOKCASES
- CHIMNEY TOPS
- DOOR HOODS
- BAY WINDOWS
- CUPOLAS
- GARDEN GATES
- STAIR ENDS
- BALCONIES
- GARDEN WALLS
- ARCADES
- PLASTER CEILINGS
- CORNICES OF WOOD

1929
- DOORWAY LIGHTING
- ENGLISH FIREPLACES
- GATE-POST TOPS
- GARDEN STEPS
- RAIN LEADER HEADS
- GARDEN POOLS
- QUOINS
- INTERIOR PAVING
- BELT COURSES
- KEYSTONES
- AIDS TO FENESTRATION
- BALUSTRADES

1930
- SPANDRELS
- CHANCEL FURNITURE
- BUSINESS BUILDING ENTRANCES
- GARDEN SHELTERS
- ELEVATOR DOORS
- ENTRANCE PORCHES
- PATIOS
- TREILLAGE
- FLAGPOLE HOLDERS
- CASEMENT WINDOWS
- FENCES OF WOOD
- GOTHIC DOORWAYS

1931
- BANKING-ROOM CHECK DESKS
- SECOND-STORY PORCHES
- TOWER CLOCKS
- ALTARS
- GARAGE DOORS
- MAIL-CHUTE BOXES

Below are the subjects of forthcoming Portfolios

Pediments
FEBRUARY

Balcony Railings
(INTERIOR)
MARCH

Gothic Buttresses
APRIL

Corner Windows
MAY

Self-supporting Stairways
JUNE

Window Heads
INTERIOR
JULY

Photographs showing interesting examples under any of these headings will be welcomed by the Editor, though it should be noted that these respective issues are made up about six weeks in advance of publication date.

1931—*Continued*
- WEATHER-VANES
- BANK ENTRANCES
- URNS
- WINDOW GRILLES
- CHINA CUPBOARDS
- PARAPETS

1932
- RADIATOR ENCLOSURES
- INTERIOR CLOCKS
- OUTSIDE STAIRWAYS
- LEADED GLASS MEDALLIONS
- EXTERIOR DOORS OF WOOD
- METAL FENCES
- HANGING SIGNS
- WOOD CEILINGS
- MARQUISES
- WALL SHEATHING
- FRENCH STONEWORK
- OVER-MANTEL TREATMENTS

1933
- BANK SCREENS
- INTERIOR DOORS
- METAL STAIR RAILINGS
- VERANDAS
- THE EAGLE IN SCULPTURE
- EAVES RETURNS ON MASONRY GABLES
- EXTERIOR LETTERING
- ENTRANCE DRIVEWAYS
- CORBELS
- PEW ENDS
- GOTHIC NICHES
- CURTAIN TREATMENT AT WINDOWS

1934
- EXTERIOR PLASTERWORK
- CHURCH DOORS
- FOUNTAINS
- MODERN ORNAMENT
- RUSTICATION
- ORGAN CASES
- GARDEN FURNITURE
- WINDOW HEADS, EXTERIOR
- SPIRES
- BUSINESS BUILDING LOBBIES
- ROOF TRUSSES
- MODERN LIGHTING FIXTURES

1935
- CIRCULAR WINDOWS, GOTHIC AND ROMANESQUE
- TILE ROOFS
- MOLDED BRICK
- DORMER WINDOWS
- ENTRANCE SEATS
- OVERDOORS, INTERIOR
- BRICK CORNICES
- SIGNS
- CHIMNEY OFFSETS
- WINDOW HEADS, EXTERIOR, ARCHED
- UNUSUAL BRICKWORK
- SHUTTERS AND BLINDS

House, Santa Barbara, Calif.
Reginald D. Johnson

House, San Bernardino, Calif.
David J. Witmer; Loyall F. Watson

House, Princeton, N. J.
Cross & Cross

House, Tulsa, Okla.
Edward Buehler Delk

House, Los Angeles, Calif.
David J. Witmer; Loyall F. Watson

House, Los Angeles, Calif.
R. W. Spice

House, New Haven, Conn.
George H. Gray

House, Los Angeles, Calif.
Winchton L. Risley

House, New York City
Lawrence Peck

House, Monroe, N. Y.
Bowen Bancroft Smith

House, Chestnut Hill, Pa.
Willing, Sims & Talbutt

House, Tulsa, Okla.
Edward Buehler Delk

House, Hillsborough, Calif.
Willis Polk & Company

House, Southern California
Roland E. Coate

House, Richmond, Va.
W. Duncan Lee

House, Santa Barbara, Calif.
James Osborne Craig

House, Southampton, N. Y.
LeRoy P. Ward

House, Southern California
Gordon B. Kaufmann

Santa Monica, Calif.
John Byers

Club House, Lakeville, N. Y.
Archibald F. Gilbert

In City Art Museum
St. Louis, Mo.

House, New York City
Sterner & Wolfe

House, New York City
Bradley Delehanty

Apartment House
New York City

House, Glen Cove, N. Y.
Peabody, Wilson & Brown

House, Pasadena, Calif.
David J. Witmer; Loyall F. Watson

House, New York City
F. Burrall Hoffman

House, Santa Barbara, Calif.
Reginald D. Johnson

Apartment House
New York City

Women's City Club, New York City
McKim, Mead & White

House, Oyster Bay, N. Y.
Charles I. Berg

House, North East Harbor, Me.
Tilden, Register & Pepper

House, Southern California
Morgan, Walls & Clements

House, Pasadena, Calif.
Donald D. McMurray

House, Palm Springs, Calif.
John Byers

House, Flintridge, Calif.
John Byers

House, Southern California
John Byers

House, Southampton, N. Y.
LeRoy P. Ward

House, Southern California
Gordon B. Kaufmann

House, Beverly Hills, Calif.
Marshall P. Wilkinson

House, Southern California
Morgan, Walls & Clements

House, Los Angeles, Calif.
Roland E. Coate

House, Darien, Conn.
Wesley Sherwood Bessell

Club House, Los Angeles, Calif.
Carl Jules Weyl

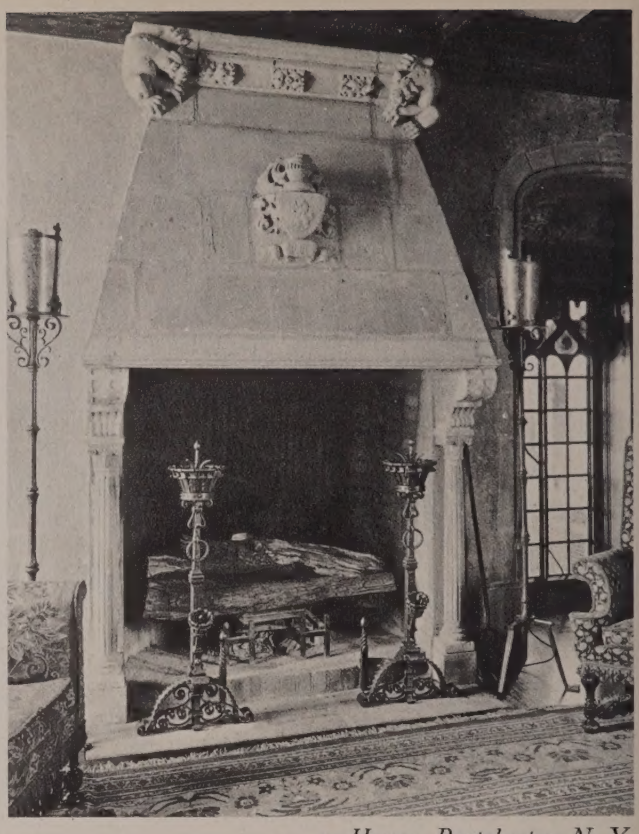
House, Southern California
Roland E. Coate

Apartments, Hollywood, Calif.
Arthur E. Harvey

House, Los Angeles, Calif.
Pierpont and Walter S. Davis

House, Hillsborough, Calif.
Willis Polk & Company

© Amemya
House, Reidsville, N. C.
Harry Creighton Ingalls



House, Portchester, N. Y.
Dwight James Baum

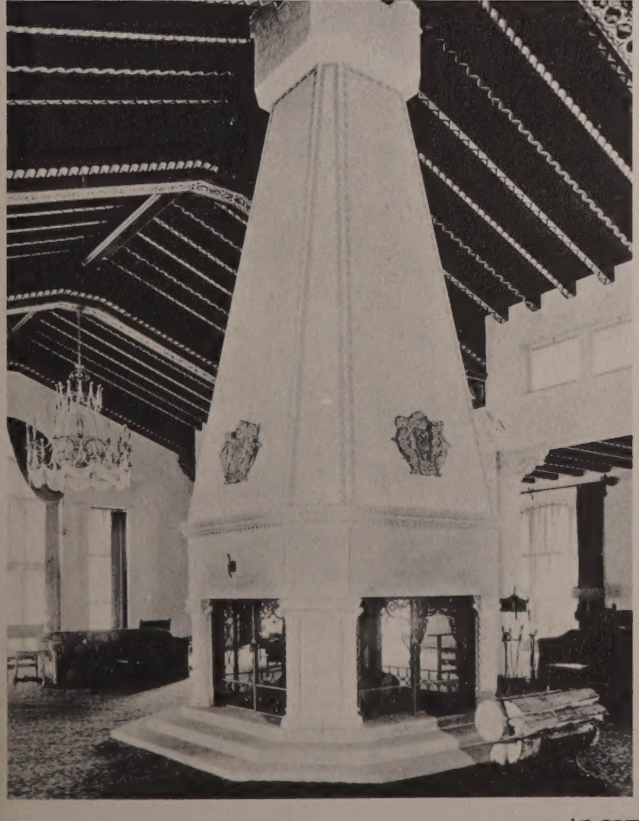
Club House, Palm Beach, Fla.
Addison Mizner

House, Hartford, Conn.
Lester Beach Scheide, Inc.

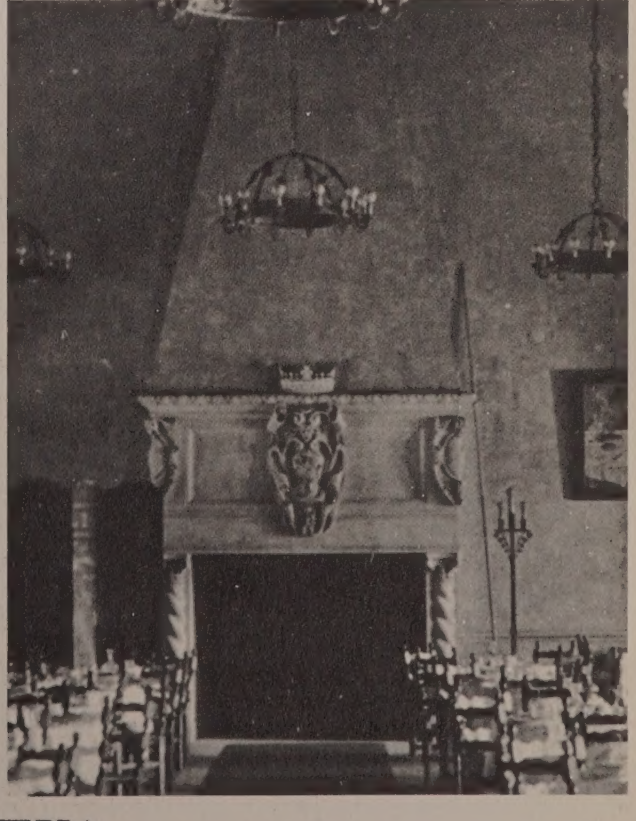
© Amemya
Bedford Hills, N. Y.
Harold Pindar Zoller

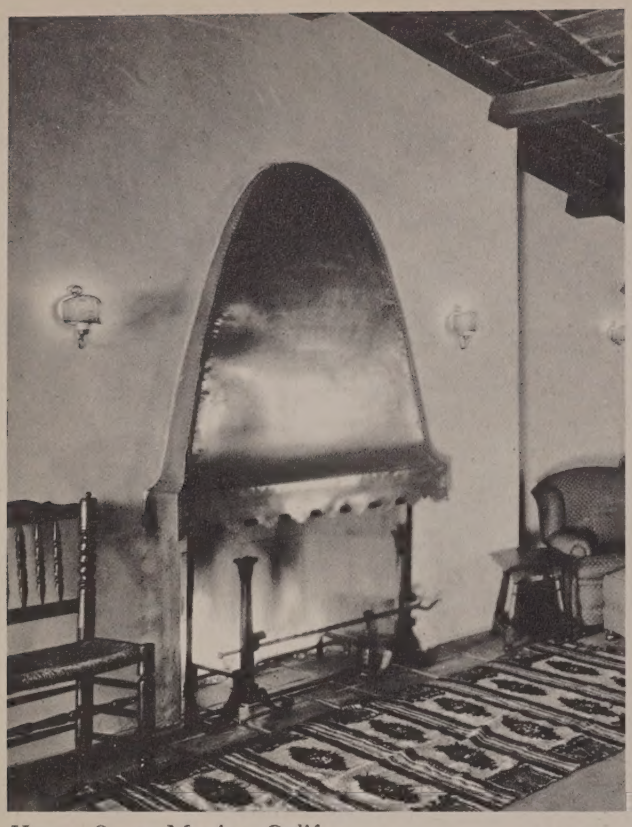
House, New York City
Edward S. Hewitt

Edgewater Beach Hotel, Chicago, Ill.
Marshall & Fox



Hotel Rolyat, St. Petersburg, Fla.
Kiehnel & Elliott





House, Santa Monica, Calif.
John Byers

Los Angeles, Calif.
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House, Santa Monica, Calif.
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House, Flintridge, Calif.
John Byers